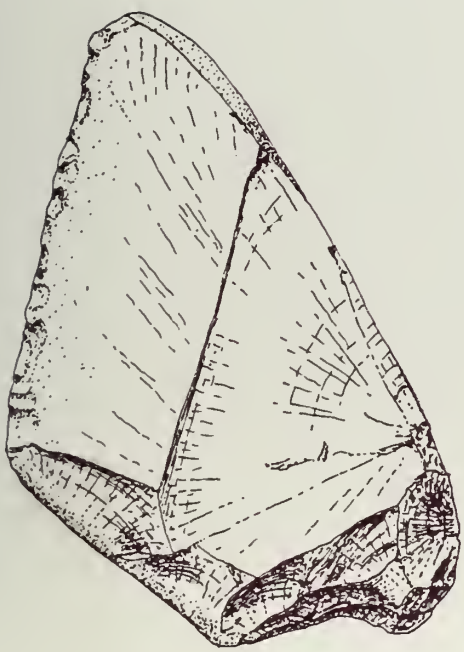
SISYPHUS SHELTER

John Gooding and Wm. Lane Shields



Bureau of Land Management

Colorado

Cultural Resources Series Number 18

SISYPHUS SHELTER

by

John Gooding and Wm. Lane Shields

With Selections by Allen Kihm

Appendices by Andrea Barnes, Linda Scott, Steve Dominguez, and Marcia Kelly

Colorado Department of Highways
Highway Salvage Report Number 50

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This document is printing in conjunction with the Grand Junction Resource Area Resource Management Plan/Environmental Impact Statement. It serves as support for this RMP/EIS, along with oil and gas leasing, rights of way, and other multiple use resource management. In addition, this work is integral to the Grand Junction Resource Area Cultural Resource Management Plan.

SERIES EDITOR: Frederic J. Athearn
DESIGNED BY: Colorado Division of Highways

FOREWORD

This volume represents a joint effort between the Colorado Division of Highways and the Bureau of Land Management. The archaeological site that is discussed in this study was excavated by the Colorado Division of Highways under the direction of their Archaeologist, John Gooding, as part of the mitigation required for significant cultural properties that will be destroyed by construction projects.

The Grand Junction District Office staff of the Bureau of Land Management assisted in the mitigation of this rock shelter, while the Colorado Division of Highways provided the funds and manpower to complete this valuable research effort. As a result, this work represents the first joint BLM-Colorado Division of Highways publication. Such state-federal cooperation is not only beneficial for both parties, but it helps engender trust and mutual understanding between agencies that are all trying to reach the same goal; the preservation of our cultural heritage.

I am pleased to make this report available to both the public and to the archaeological profession. I know that its contents will be useful for a long time to come while also enhancing our scientific knowledge of the past.

Kannon Richards

Kannon Richards
State Director
Bureau of Land Management
Colorado

PROLOGUE

Sisyphus's greatest exploit was the outwitting of Death (Thanatos) himself. He had aroused the anger of Zeus by telling the river god, Asopus, of Zeus's rape of Asopus's daughter Aegina, and Zeus sent Death to carry Sisyphus off. Sisyphus successfully resisted Death and chained him; so long as he was bound, no mortals could die. Eventually Ares freed Death and handed Sisyphus over to him, but before he went down to the Underworld Sisyphus left instruction with his wife Merope, not to make the customary sacrifices after his death; when Hades found that no sacrifices were being made he sent Sisyphus back to remonstrate with Merope. So he returned to Cornith and stayed there until he died in advanced old age. It was for his treatment of Death and Hades that he was punished in the Underworld.

Morford and Lenardon 1971:376-377

And also I saw Sisyphus enduring hard sufferings as he pushed a huge stone; exerting all his weight with both his hands and feet he kept shoving it up to the top of the hill. But just when he was about to thrust it over the crest then its own weight forced it back and once again the pitiless stone rolled down to the plain. Yet again he put forth his strength and pushed it up; sweat poured from his limbs and dust rose up high about his head.

Morford and Lenardon 1971:224

"Are there always this many rocks in shelters?"

Tim Watts 1980

ABSTRACT

The Sisyphus Shelter, 5GF110, is a multicomponent rockshelter complex composed of two shelters and a natural rockfall enclosure. The site is located on the northwest side of the Colorado River, midway between the present communities of Parachute and DeBeque. The thirteen major stratigraphic levels in the three separate areas of the site contain a series of occupations tentatively assigned to Preformative (Fremont?) and Archaic culture groups. During excavations twenty-six features of human origin were discovered, one of which appears to be a slab-lined habitation floor that possessed remnants of coursed wall bases and a hearth area. Artifacts retrieved from floor context appear to be of late Archaic styles and radiocarbon dates support that observation. A total of seventeen radiocarbon dates obtained from charcoal samples from the three site areas ranged from a modern sample to a sample dated at 4400 B.P.

The intent here is the description of the various occupations of the shelter complex and interpretation of the data in the light of current occupation models for the northern Colorado Plateau. It is suggested here that the occupations at Sisyphus were discontinuous and seasonally determined. The occupation sequence represented at the site is not totally representative of the region or even the subregion in chronological terms. However, Sisyphus is representative of 1) an established seasonal strategy, and 2) a locational strategy that is consistent with an Archaic hunting and foraging lifestyle that was basically unaltered through time.

ACKNOWLEDGMENTS

The research and data collection of 5GF110 extended over several years from the time it was first recorded until the time of final compilation of this report. Contributors to the effort include Carl Conner, Barbara Love-de-Peyer, Tommy Fulgham, Lucy Bambry, Casimer Lorentz, Jill Seyfarth, Susan Kreuser, Steve Wallace, Belinka Novotny, Margaret Kadziel, Terril Nickerson, Debra Angulski, Barbara Blair, J. T. Mason, Stephanie Cook, Tim Watts, Gale Garner, Geoffry Reed, Mary Francis McClellan, Steven Dominguez, Mark Oehlberg, and Thomas Wolf.

A note of thanks is extended to John Crouch of the Bureau of Land Management, Larry Abbott of the District 3 Department of Highways office, Ann Hedlund of the University of Colorado Museum, Linda Scott of Palynological Analysts, and Irene Stahle of Dicarb Radioisotopes.

Credit for aiding in completion of this report goes to Josef Muennig for photography and correction and clarification of many figures, to Steve Dominguez for the majority of artifact illustrations and to Brian Naze for several figures and artifact illustrations. Marcia Kelly offered critical and lively proof reading. Finally, credit is given to Andrea Barnes, whose typing, proofing, collating, editing, compiling, and constructive criticism extended above and beyond the call of duty.

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INTRODUCTION

The Colorado Department of Highways (CDH) Highway Project No. I 70-1(19), DeBeque East and West, placed the westbound lane of U.S. Interstate 70 through the location of 5GF110. Thus, the necessary mitigation of the site was conducted by the CDH Archaeology Unit. The property containing the site is managed by the Bureau of Land Management (BLM).

The State Archaeologist, acting for the State Historic Preservation Officer (SHPO), notified this office on May 23, 1978 that 5GF110 was eligible for inclusion in the National Register of Historic Places. A proposal presented by the CDH was deemed to mitigate the site properly and the SHPO concurred with the determination of No Adverse Effect. Pursuant to determination of significance, mitigation of the site was required of both the CDH and the BLM by the following:

The Antiquities Act of 1906 (34 Stat. 225, 16 U.S.C. 431 et seq.)

The National Historic Preservation Act of 1966 (80 Stat. 915, 16 U.S.C. 470)

The National Environmental Policy Act of 1969 (83 Stat. 852, 42 U.S.C. 4321 et seq.)

Executive Order 11593, "Protection and Enhancement of the Cultural Environment" (36 FR 8921, 16 U.S.C. 470)

The Archaeological and Historic Preservation Act of 1974 (88 Stat. 174, U.S.C. 469 et seq.)

The Federal Aid Highway Act of 1956, Section 305, Archaeological and Paleontological Salvage (72 Stat. 913 and 74 Stat. 525, 23 U.S.C. 305)

Archeological and Paleontological Salvage (DOT, PPM 20-7)

Federal Land Policy Management Act of 1976

Fieldwork was completed at 5GF110 under U.S. Department of the Interior Federal Antiquities Permit No. 80-CO-017 on April 27, 1980. The mitigation through excavation has, by definition, terminated the eligibility of 5GF110 for inclusion to the National Register of Historic Places. This report describes the results of the excavation and analysis of remains recovered from the site. The artifacts and samples retrieved from the site are curated at the University of Colorado Museum.

The data from Sisyphus Shelter contribute important information addressing several issues of archaeological concern for the prehistory of western Colorado. Briefly, they are the location of the site at the contact of the Southern Rockies and the Colorado Plateau geographical provinces, the local environment of the site in the pinyon/juniper ecozone adjacent to the large riverine environment of the Colorado River, the undisturbed deep deposits in the rockshelter and the paucity of excavated rockshelter data in the area.

All of the above points are very general in nature and in response to that, this report should be considered data oriented. There was no preconceived selection process for hypothesis testing. Consequently, this report is organized so that each section stands alone for use as a reference tool. It can be read strictly for environmental data, for architectural data or for artifactual data. Conversely, it can be read strictly for stratigraphic information. To that end, the typological data for the features and the artifactual remains are handled separately from the stratigraphic interpretations of those data, resulting in a large number of chapter and sub-chapter headings.

Even though Area C of Sisyphus Shelter is stratified, the evidence of cultural deposition in each of the strata and the abundance of materials within each of those levels contributed to a complex problem of separating and defining occupations. Several chapters, sub-chapters and appendices address this problem. These are Occupational Stratigraphy, Stratigraphic Relationships of Features, Material Types (Levels I - Surface), Artifact Summary by Level, Occupation Sequence, Appendix II (pollen analysis) and Appendix III (paleoenvironmental/lithic technology relationships). Each of the above sections addresses the problem of stratigraphic relationships within the site. By concentrating on these areas, the tool assemblages and assemblage/feature/environmental relationships may be most easily understood.

ENVIRONMENTAL SETTING

John Gooding, Allen Kihm, and Wm. Lane Shields

Location

Site 5GF110 is located in the Grand Valley midway between Rifle and Grand Junction along U.S. Highway 6 and 24. Legal location of the site is the SW 1/4 of the NW 1/4 of the NE 1/4 of the SE 1/4, Section 12, T8S, R96W, Sixth Principal Meridian, Garfield County, Colorado. It is approximately 15 m northwest of the current roadbed and lies within the proposed alignment for Interstate Highway 70 (Figure 1). The site is in southern Garfield County, 0.8 km north of the Garfield-Mesa County Line. The dominant physiographic features near the site are the Roan Cliffs, Battlement Mesa, and the Colorado River. Mount Logan, a dominant feature of the Roan Cliffs, 3.5 km northwest of the site, rises 994 m above it. Horsethief Mountain, at the western end of Battlement Mesa, is 11.2 km to the southeast and rises 820 m above the site. To the south, 19 km beyond Battlement Mesa, is Grand Mesa. The Colorado River is presently 1.5 km southeast of the site at its closest approach and lies 64 m lower. A Reference Point for the site, used as datum for Areas B and C, is 1570.3 m above mean sea level.

Important for the purpose of comparison are two sites located in the vicinity of Sisyphus Shelter. Near the head of DeBeque Canyon, 15 km to the southwest, is the DeBeque Rockshelter (5ME82), which has been test excavated and reported by Reed and Nickens (1980). The Kewclaw Site (5GF126), an excavated open pithouse site, is located approximately 11 km upstream from Sisyphus Shelter. It is situated on Battlement Mesa overlooking the Colorado River near Parachute Creek (Carl Conner, personal communication, 1983).

Geology

The stratigraphically lowest formation of concern to this report is the Hunter Canyon Formation (Figure 2) of Late Cretaceous age (70-66ma)[1], (Johnson and May 1980). It is composed of massive tan sandstones with interbedded gray shales. Exposures tend to be near vertical as exhibited in DeBeque Canyon. Rockshelters are commonly formed in this unit, e.g., DeBeque Rockshelter (5ME82), 5ME78, and 5ME83 (Gooding 1974).

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[1] ma = megaannum, representing one million years

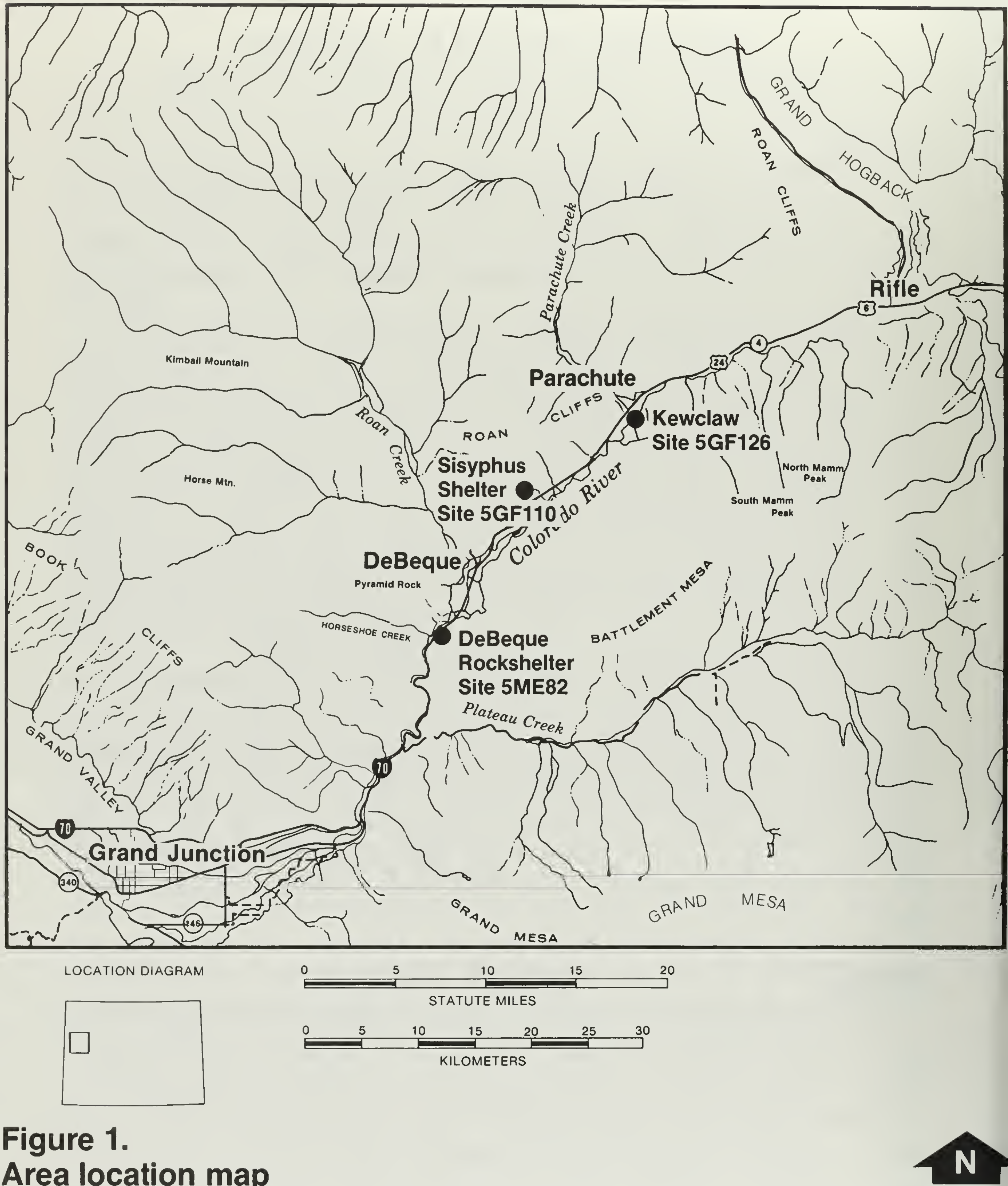


Figure 1.
Area location map

Sisyphus Shelter (5GF110)
DeBeque Rockshelter (5ME82),
and Kewclaw Site (5GF126).

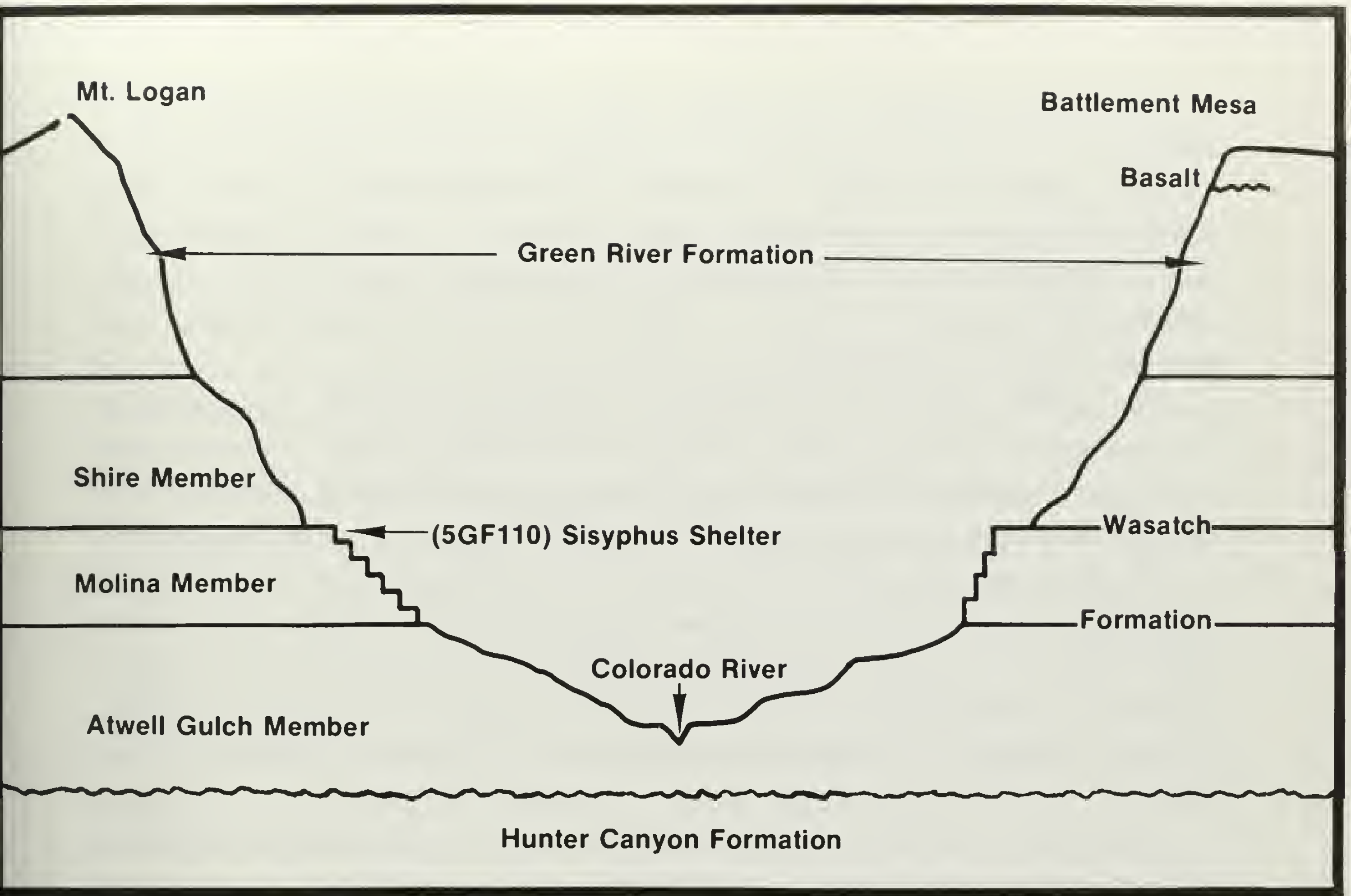


Figure 2.
Generalized stratigraphic cross-section of the Grand Valley near 5GF110(NW to SE).

Lying unconformably on the Hunter Canyon Formation is the Wasatch (also known as the DeBeque) Formation. This formation has three distinct units (Donnell 1969) and is of late Paleocene to early Eocene age (53-49ma). The basal unit is the Atwell Gulch Member, comprised of gray, burgundy, and purple mudstones with interbedded lenticular tan and white sandstones. Outcrops form gentle to moderate slopes with exposures often developing a badlands type of topography.

The middle unit of the formation is the Molina Sandstone, a series of tan sandstones with minor gray and green interbedded shales. Outcrops tend to be near vertical with exposures forming a steep stairstep pattern. Site 5GF110 is located in a sandstone-shale sequence at the top of this member.

The Shire Member is the highest unit of the formation. It is similar in lithology to the Atwell Gulch Member, except that the mudstones are mostly brick red, yellow, tan, and purple. Most outcrops form gentle slopes; however, steeper slopes with badlands exposures occur near the Roan Cliffs. The red mudstones of this member give the Roan Cliffs their characteristic color.

Conformably overlying the Wasatch Formation is the Green River Formation of early to middle Eocene age (49-47ma). It is composed of a series of thin-bedded siltstones, oil shales, and sandstones. Outcrops are steep with exposures being near vertical, talus-producing slopes. Capping the Roan Cliffs, this formation is the gray-green band which forms the escarpment.

Except for one important addition, the same geologic section is present on Battlement Mesa, south of the Colorado River, as on the Roan Cliffs. This addition is a late Miocene (10ma) basalt flow which caps Battlement Mesa. Once contiguous with Grand Mesa, this flow is the last in a series stretching back to 21.6ma (Larson 1968). These older flows are restricted to an area northeast of Battlement and Grand Mesas, centered in the Flat Tops Wilderness Area. There is no evidence that any of these basalt flows reached the Roan Cliffs or the area of the site.

Physiographic History and Site Development

The present topography of the area of the site began to develop in the late Tertiary. Drainage was to the north until a series of uplifts in the early Pliocene (5ma) caused a shift to the west and entrenchment of this modern pattern (Yeend 1969). A period of slow, widespread upwarping

continued into the Quaternary. Yeend (1969) has estimated 1000-1200 m of downcutting by the Colorado River prior to the development of any pediment slopes. This estimate, when added to the 400 m layer of the oldest pediment slopes above the river, gives a value of 1400-1600 m of uplift since the Miocene. This value is supported by evidence from the Flat Tops Wilderness Area. This area with its series of dated basalt flows shows the beginning of uplift to be latest Miocene or Pliocene times. Fossil evidence in this area suggests approximately 1800 m of uplift in the last 5-10ma (Larson 1968).

The oldest pediment slopes in the Parachute-DeBeque portion of the Grand Valley are early Quaternary in age and lie 400-450 m above the Colorado River (Yeend 1969). Samson Mesa, south of the river and across from 5GF110, is a remnant of this phase of pediment formation. North of the river only a few isolated patches of the older pediment slopes remain. The combination of south-facing slope, sparse vegetation and the soft mudstone bedrock has led to extensive erosion. Even the younger pediments have been heavily dissected; as a result, no large contiguous pediment slopes exist north of the river in this area.

The next period of pediment development is related to late Quaternary glaciations. During the Bull Lake Glaciation, terraces developed which now lie 50-100 m above the Colorado River (Yeend 1969). The only visible remnants of the terraces are south of the river on the north side of Battlement Mesa. Site 5GF110 is flanked by patches of pediment gravels which were developed during the Pinedale Glaciation. These gravels occur up to 70 m above the river and merge into the modern floodplain. Terrace gravels south of the river, which are comparable in age to those near the rockshelter, have preserved an organic layer which has yielded a radiocarbon date of 9730 $\pm$ 500 B.P. (Yeend 1969:27). The maximum date for the formation of the rockshelter would then be approximately 20,000 years B.P. The actual age of formation is probably somewhat younger owing to the time necessary for the dissection of the terrace and erosion of the sandstone. Based on an erosion rate of 0.3 m/1,000 years, twice the erosion rate of the Colorado River (Yeend 1969), an estimate of the time of formation of the rockshelter would be 10,000 to 15,000 years B.P.

The modern floodplain of the Colorado River developed during the Holocene. Some eolian sedimentation has occurred, probably during the early

Holocene, and perhaps related to the Neoglaciation. These local deposits are already dissected by the modern arroyos. Mudflows were common during the Holocene, altering most of the older geomorphic features in a way similar to recent events. In the summer of 1979, a mudflow originating on the Roan Cliffs between Mount Logan and Mount Callahan deposited up to 30 cm of mud as far as 800 m from the cliffs. At the present time, all of the permanent streams are downcutting, and arroyos are actively forming. Deposition is occurring only at low elevations along ephemeral streams.

At the time of the oldest preserved occupation of 5GF110, based on radiocarbon dates, the Colorado River was only slightly higher in elevation than at present. With a rate of 16.5 cm/1,000 years and a basal date of approximately 4,500 years B.P., the river would have only been 75 cm higher than it is today. Judging from the location of the river in its floodplain, and from the morphology of the floodplain, the river may have been slightly closer to the site than at present. The maximum movement would be 0.5 km, with the distance to the site then being 1.0 km. In summary, the present physiographic conditions are basically the same as they were during the occupation of 5GF110.

Moisture/Temperature

The closest weather stations to the site are located in Collbran, Rifle, and Grand Junction. However, the overall environmental settings of these stations differ greatly. The Collbran station is on the north side of Grand Mesa at an elevation 225 m higher than the site. The data from this station, although informative of the general environment of the area, are not directly comparable to the site's immediate environment. However, the setting of Collbran is the closest analog to the environment on the north side of Battlement Mesa. Rifle and Grand Junction, approximately equal distances from the site, are both in the Grand Valley of the Colorado River (formerly the Grand River). Grand Junction, in a broader section of the Grand Valley at a lower elevation than Rifle, occupies an arid and desert-like environment; semiarid describes more aptly Rifle's ecologic setting. The site's setting, 172 m higher in elevation, does not correspond to that of Grand Junction. It is, however, more similar to Rifle in setting and is only 60 m lower in elevation. Thus, weather data from Rifle are most comparable to the weather conditions at the site.

Precipitation in the area is highly variable. Rifle receives an annual average of 28 cm, mostly from July through October. Collbran receives 40.4 cm annually with the heaviest precipitation in two periods: March to May and August to October (USDA 1941:799). An isogram of annual precipitation amounts indicates that the immediate area of the site receives approximately 28 cm of moisture with 15.5 cm falling between April and September (USDA 1941:807).

Reflecting this variable precipitation pattern are the permanent streams in the vicinity of 5GF110, the Colorado River and Roan and Parachute Creeks. These waterways have an extremely variable flow, peaking with spring runoff and declining to low flow in the late fall. All are easily crossed except during spring flooding. Measured at the Cameo gauge, the Colorado River has an average flow of 121 cubic meters per second (cms) (Iorns et al. 1965:149). Roan Creek has an average flow of 1.2 cms. Parachute Creek, with the smallest drainage basin, has an average flow of 0.53 cms (Coffin et al. 1971). However, it is often dry, or nearly so, from December through April.

Mean temperatures in the area are less variable than the precipitation from one station to another. Collbran has an average July high temperature of 20.4°C and an average January high of -5.6°C. Rifle has 21.7°C July and -5°C January averages. Graphs of the statewide July and January temperature averages show 5GF110 to be near the 20°C July isotherm and between the -6° and -8°C January isotherms (USDA 1941:799,804). The actual temperatures in the shelter are much higher than these figures, owing to its southern orientation.

Flora

Grady (1980:40-53) has described the vegetation types of the nearby Piceance Basin area, which includes the area where site 5GF110 is located (Grady 1980:24-29). Consequently, a complete flora list will not be presented in this report. Four communities are represented at or near 5GF110. A Low Elevation Pinyon-Juniper Woodland Community surrounds the site with Utah Juniper (*Juniperus osteosperma*) the dominant species. Pinyon pine (*Pinus edulis*), big sagebrush (*Artemisia tridentata*) and Mormon tea (*Ephedra viridis*) are also present. South of the site along the Colorado River is a Cottonwood Forest Community with broadleaf cottonwood (*Populus*

sargentii), rabbitbrush (Chrysothamnus viscidiflorus), skunkbrush (Rhus trilobata) and big sagebrush. North of the site on gentle, south-facing slopes is a more xeric community, the Low Elevation Big Sagebrush association. Big sagebrush is the dominant species. These plant communities are dependent on moisture as much as any other single factor. Although the nearest permanent water to the site is the Colorado River, several small springs occur along the base of the Roan Cliffs. The water, however, either evaporates or soaks into the soil before it flows very far from the cliffs. Only 15.5 cm of precipitation falls during the warm months in this area (USDA 1941:799). Marlatt (1973:59) estimates the evaporation demand to be three times the precipitation rate. A much different plant community exists where this evaporative demand is lower. On the north slope of Battlement Mesa, moisture has a chance to soak into the soils. As a result, both the soils and vegetative cover are better developed. A High Elevation Pinyon-Juniper Woodland Community is developed on the steeper slopes of the mesa with pinyon pine much more common than in the lower elevation community. Isolated stands of quaking aspen (Populus tremuloides) also occur. The terraces at the base of Battlement Mesa support crops of timothy (Phleum pratense) and alfalfa (Medicago sp.).

All of these communities are within a relatively short distance (10 km) of 5GF110 and are easily accessible. This variety of plant associations provides not only a wide assortment of species of use to man, but also a variety of habitats for mammal and bird species.

Fauna

The most current population studies of the native fauna for Colorado are the ongoing Latilong Distribution Studies, sponsored by the Colorado Division of Wildlife. The data relevant to Sisyphus are for the area designated Block 8, which is western Colorado (Bissel ed. 1978; Kingery and Graul eds. 1978; Hammerson and Langlois eds. 1981). Condensed versions of the latilong studies, along with their keys, for mammals, birds, reptiles, and amphibians in western Colorado are presented in Appendix V.

The latilong study is perhaps most appropriate because it designates status, habitat and abundance of the various species and is a continuing update of that data. The greatest value of this study over previous efforts at synthesis (e.g., McKean and Neil 1974; Armstrong 1972) is that these data are 1) generated by specific in-field observations, 2) baseline studies that

do not attempt any theoretical interpretations, and 3) very specific about habitat identification for each of the species. It is presumed that certain species that inhabited this region in prehistoric times are not inhabitants now. Whether or not any of those species were exploitable resources by prehistoric occupants is as yet unresolved.

The faunal remains recovered at 5GF110 are slightly at variance with the latilong studies, e.g., the evidence of bison at the site, and this is attributed to effects of recent Anglo development of the region. These variances will be discussed in some detail in the interpretations section.

Fish are a potential resource in the Colorado River but population levels of native species are difficult to judge. The reptilian fauna is comprised of lizards and snakes. Turtles are uncommon in west-central Colorado (Stebbins 1966:238-239).

The fauna and flora of the area were relatively stable, and extinction has not been a factor within the last 5,000 years. According to Grady (1980:127-130), annual average temperatures do not appear to have changed more than one degree Celsius, plus or minus, within the last 5,000 years. Considering these data, population levels and species ranges may have fluctuated, but not to the exclusion of any significant species. With the exception of the large mammal species noted above, the modern fauna would appear to reflect accurately the prehistoric diversity. The plant communities now present were probably the same ones dominant during the last 5,000 years. Modern environmental conditions near the site appear to be valid indicators of the conditions which prevailed during the occupation of 5GF110.

ARCHAEOLOGICAL BACKGROUND
John Gooding

At this point in our understanding of the prehistory of the northern Colorado Plateau, there are numerous questions that deserve to be addressed. Unfortunately, archaeological data rarely present themselves to the investigator in full blossom with all of the attendant radiocarbon dates, unique tool assemblages, distinctive stratigraphic levels and comprehensively reconstructable environmental data in complete support of one another to provide simple answers. Furthermore, the data never coincide with the current ethereal, theoretical constructs regarding prehistoric behavior patterns. The scope and character of the analysis presented here is limited by the data retrieved from 5GF110. To my knowledge, no excavation of a single site has ever forced a reinterpretation of all previous work in any region, though this commonly held fantasy is pursued actively in the discipline, to both good and bad ends.

The above preamble may be reread usefully as the introductory paragraph to the chapter on interpretations where the topic will be the integration of 5GF110 into the established body of understanding for the region. For our purposes here, there are three important considerations in the archaeological background of the region.

First, there is the question of the theoretical framework which has centered on the cultural identity of the prehistoric inhabitants of the region through time. Initially, the identity questions were simply expansions of contemporary interpretations based on the scant comparisons available. This resulted in speculations of massive Athabascan migrations through the mountains, varieties of corn hitherto unknown outside Peru, and the existence of Ute doghouses (Huscher 1939; Huscher and Huscher 1939, 1943; Anderson in Hurst 1948). These and other early works on western Colorado prehistory by the above authors made numerous data base contributions to the discipline. However, of paramount concern here is the weakness of straight analogy, regardless of distance or direction, as the basis for archaeological interpretation.

The theoretical framework matured substantially with the traitlist definition of the Uncompahgre Complex (Wormington and Lister 1956). It

placed the prehistoric northeastern Colorado Plateau (western Colorado) firmly under the rubric "Desert Culture" postulated by Jennings (1953) and the "Fremont" in Wormington's (1955) reappraisal. Thus, even though the thrust of Wormington and Lister's work was to define the culture on the basis of the evidence, the efforts at synthesis brought on numerous additional frameworks by Wormington (1955), Aikens (1966), Ambler (1966), Gunnerson (1969) and Marwitt (1970). It seems that the archaeological interpretations for western Colorado became caught up in the dialogues on the Fremont with little opportunity for more thorough development of understanding of the local archaeology. The one exception to this inertial direction in interpretations of prehistory of western Colorado is the work by Buckles (1971) on the Uncompahgre Plateau, which was an attempt at implementing the direct cultural/historical approach to interpreting the data base. Buckles, however, presented no obvious basis for the selection and interpretion of the sites he tested. Trait characteristics within his own sample were insufficient to trace cultural development, which is necessary for the direct cultural/historical approach. The goal of the research was appropriate, but not achieved.

A third phase in the evolution of the theoretical framework is evident in the 1970s with the advent of behavioral-based models such as Toll's (1977) application of Clarke's (1968) polythetic model and Grady's (1980) application of site catchment analysis models based on the works of Higgs (1972, 1975), Higgs and Jarmon (1969, 1972) and Vita-finzi and Higgs (1970). The diverse interpretations of the regional prehistory culminated in the clash known as the Fremont/Sevier Symposium in 1978 (Madsen ed. 1980). It was established at the symposium that the synthesis and interpretation of the northern Colorado Plateau prehistory is composed mostly of irresistible forces and immovable objects; however, through it all and in spite of it all, the irrevocable fact is that the data base has been developed. The problem is that most of the synthesizers of this area have attempted to jump immediately from fieldwork to processual interpretation (Madsen 1980; Lohse 1980) and have forgotten that Willey and Phillips (1958) identified a heirarchy for the development of interpretation which requires that sufficient fieldwork be accomplished before cultural/historical integration and processual interpretation can be attempted. Sufficient

cultural/historical integration must be verified before one can proceed with processual interpretation. It is implicit in the model, but seems often to be forgotten.

The second question in consideration of the archaeological background of the region is the impact of cultural resource management on the data base. Prior to the 1970s, archaeological investigations were centered on theoretical topics as discussed in the first two phases above. Cultural resource management exploded the data base and changed the emphasis from the pursuit of looking for clues to the problem of making the mountain of data meaningful. Examples of this include surveys and overviews such as Hurlbutt (1976), Toll (1977), Hibbets et al. (1979) and Grady (1980).

Furthermore, the Colorado Plateau has yielded a plethora of rockshelters which have been excavated with increasing frequency and thoroughness. These include Hell's Midden (Lister 1951), Mantles Cave (Burgh and Scoggin 1948), Swelter Shelter (Breternitz 1970), Cowboy Cave (Jennings 1975, 1980), Sudden Shelter (Jennings et al. 1980), DeBeque Rockshelter (Reed and Nickens 1980), Luster Cave, the Alva Site, the Taylor Site, Roth Cave, the Moore Site and the Casebier Site (Wormington and Lister 1956), the Hauser Site (Lister and Sanburg 1963), Deluge Shelter (Leach 1970), 5ME217 (Lutz 1978), Christmas Rockshelter, Long Draw Shelter, Carlyle Shelter, Juanita's Shelter, Monte's Shelter (Buckles 1971), Walter's Cave (Jennings 1980), Thorne Cave (Day 1964) and Pint-Size Shelter (Lindsay and Lund 1976).

The archaeological researchers working on the Colorado Plateau have generated an internal theoretical conflict in attempting to use, and at the same time define, the term "Archaic." An understanding of this problem as it applies specifically to the Colorado Plateau also requires some historical background, but simply put, the archaeological use of the term "Archaic" has gone through a transformation in definition which led away from the description of an economic system toward a definition denoting a roughly defined time period. This free use and interpretation of the term may be a contributing factor to the first problem outlined above.

The cornerstone for the archaeological definition for the term "Archaic" is undoubtedly the discussion of the term by Willey and Phillips (1958:104-143). For the Colorado Plateau, the most relevant application of their definition is in Jennings (1978:29-93), wherein the discussion of the

"Desert Archaic" revolves around the topic of broad based, multiple resource subsistence patterns. This is the culmination of many years of his investigation on this topic, and in all cases the accepted definition was Archaic stage economic development (Jennings 1953, 1955, 1978).

Curiously, in a study entitled <u>The Archaic of the Northern Colorado Plateau</u>, Schroedl (1976) developed a chronology spanning the years 8000 B.P. to 1500 B.P. and called it the "Archaic." In the study, arguments are presented to the effect that

> the purported "broad spectrum" foundation of Archaic adaptation is in error and ought to be re-evaluated. A refined definition of the Archaic presented here is: A stage of migratory hunting and gathering cultures following a seasonal pattern of efficient exploitation of a limited number of selected plant and animal species within a number of different ecozones (Schroedl 1976:11).

In support of the new definition, Schroedl (1976:13-44) devotes seventeen pages to radiocarbon evidence, four pages to cultural evidence, four pages to botanical evidence and eight pages to geomorphological evidence. It appears that the scope of the cited evidence is not oriented to support the new definition of the Archaic.

Turning again to Jennings' synthesis, he has incorporated the Anasazi and the Fremont as examples of Formative stage cultures (1978:95-220), again applying definitions outlined by Willey and Phillips (1958:144-181). Yet in opening statements on the Fremont, Jennings characterizes the Fremont as having had "... a quite flexible or adaptable lifeway showing local diversity within a general model (Fig. 141)" (Jennings 1978:155). Unfortunately, the figure referenced is a map and appears to be less appropriate for the specific definition of the Fremont than Figure 142 (Jennings 1978:158). Thus, one must ask the question, are the Fremont truly Formative? If so, then it is no wonder that there is extreme difficulty in distinguishing the Archaic on the Colorado Plateau.

The tendency toward free undefined use of the term Archaic has proceeded even further afield with the coining of the term "Post-Archaic" (Holmer and Weder 1980:55-68). While there seems to be an implicit assumption that the term refers to a chronological period, Holmer and Weder use their data to argue for the existence of what appear to be Archaic stage socio-economic

patterns to explain the spatial distribution of projectile point styles (Holmer and Weder 1980:67-68).

Thus, in the current literature the term "Archaic" is used for two purposes. First, it is used as a chronological term and identified as "Archaic period" where it applies to a range of chronometric dates. Second, it is used as a socio-economic term "Archaic stage," following the definition by Willey and Phillips (1958:104-143). Partial resolution of this question will be attempted in the Conclusions and Observations section of this study.

To interpret the prehistory of the Colorado Plateau/mountain fringe, one must contend with three problems: (1) various and conflicting theoretical approaches, (2) utilization of a large data base without falling into the trap of selective references, and (3) terminological inconsistency.

The relationship of the archaeology of 5GF110 to these problems defines the character of the contribution the site can make to the regional data base and the theoretical framework. In terms of the data base, the site provides useful, and in many ways contrasting, stratigraphic data when compared to other rockshelter sites.

SITE DESCRIPTION

John Gooding

The Colorado River flows through the Grand Valley from the northeast to the southwest. As one travels down river, the most prominent surface features are the Roan Cliffs topped by Mount Logan on the north and northwest, and Battlement Mesa with its large terraces on the south and southeast side of the valley. The valley varies in width from 2 to 6 km depending on confluences of subsidiary drainages. The erosional pattern of this portion of the valley is generally perpendicular to the direction of the river, so the intermittent streams and gullies that empty into the river trend in a northwest/southeast direction. These streams and gullies cut through the Molina Member discussed in the previous section. The character of the headward erosion in this sandstone is the exemplary pattern of the classic Colorado Plateau landscape but on a smaller scale.

In southwestern terms, 5GF110 (Figure 3) is located at the right side of the head of a miniature rincon that measures approximately 70 m across and opens to the southeast. Thus, the openings of the rockshelters face in a southerly direction. The elevation from the floor of the rincon to the surrounding rim is 9-10 m. As a result, the south-facing wall is sheltered from the northerly and down-valley winds which are common in the winter.

Site 5GF110 is composed of three areas, designated A, B, and C (Figure 4). Area A is the smaller rockshelter. It opens at ground level and was formed by one massive sandstone boulder that is detached from the formation. This boulder is leaning against other large boulders so that this shelter faces south/southwest. Owing to the shape of the overhang there are, in effect, two areas that provide shelter from the elements. The small and low southeast portion of Area A is separated from the remainder of the shelter by the ceiling almost touching the bedrock floor. This area slopes to the south and is cramped, offering no more than 50-60 cm clearance. In the larger portion of Area A the ceiling is as high as one meter and the floor rises to the north fairly rapidly. As illustrated in Figure 4, there is an opening at the right side of the boulder which exposes the shelter to sheet erosion during heavy rains. The area provided adequate shelter only during light rains and during rains when the soils were not saturated. The original surface evidence of Area A indicated that the area had been a

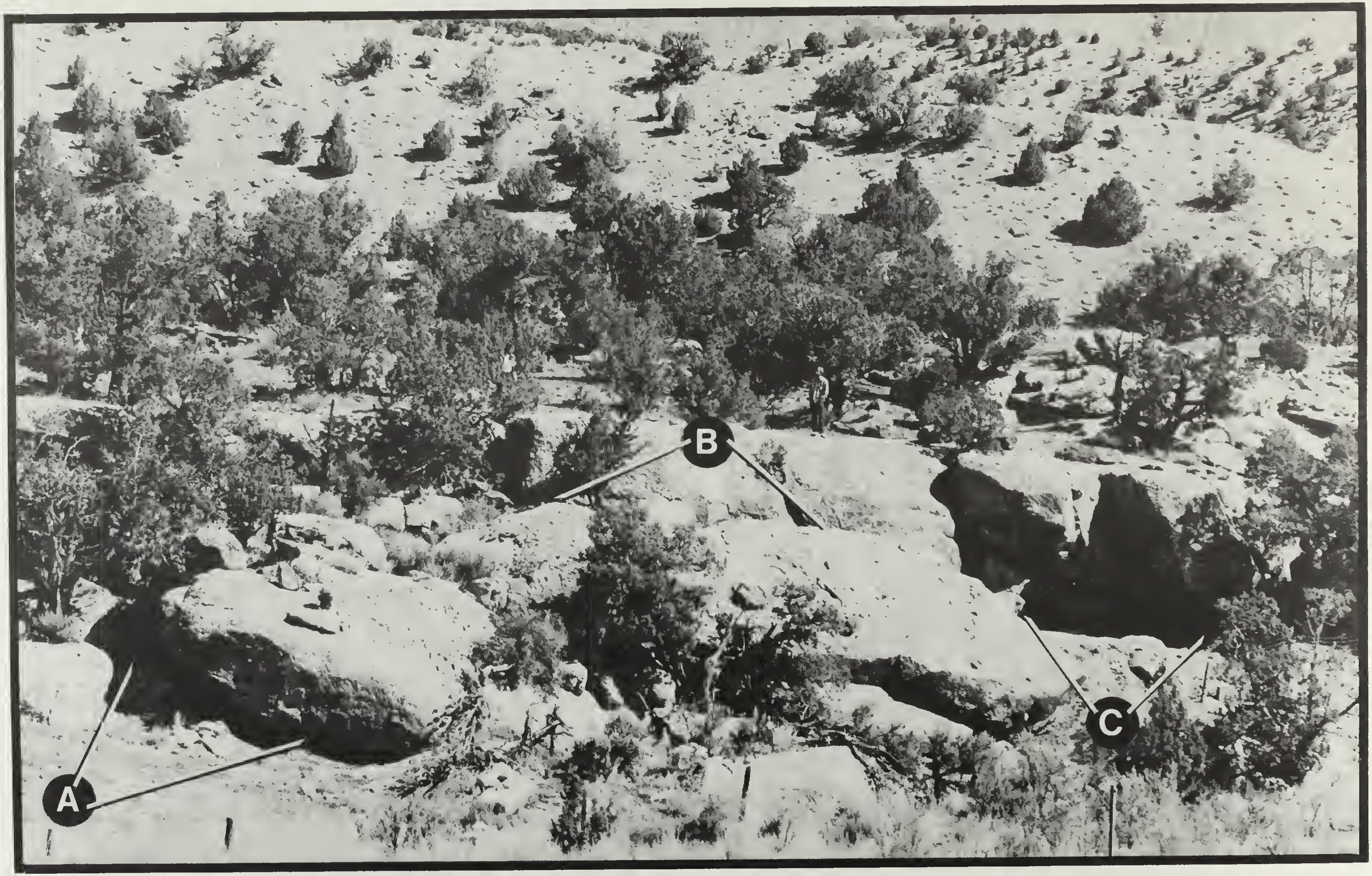


Figure 3.
View of Site 5GF110, Sisyphus Shelter. Areas A, B and C are shown. In the background, the area devoid of vegetation is the base of the Roan Cliffs, north of the site.

Figure 4.
Planview site map of Sisyphus Shelter (5GF110)
Instrument station set AA/O
1570.3 meters above mean sea level

natural shelter for sheep. These were major factors in the erosional processes and activities that disturbed the prehistoric cultural record in Area A. There was intermixture of the uppermost levels with sheep dung. However, a period of roof fall had preceded recent occupation and had sealed Level VIII. Owing to the slope and the current ranching activities, almost no cultural deposits and no clear stratigraphy were encountered outside the shelter at Area A. It was computed that a surface area of 32 m^2 covers all of the intact activity areas that could be associated reasonably with Area A.

Area B, located between Areas A and C can best be described as an open boulder enclosure. The north side of the area is a bedrock exposure of the formation that extends to the top of the rim (approximately 3 m). The south boundary of Area B is a second massive boulder 2 m high that abuts the top monolith of Area A. In terms of elevation, Area B is the highest of the three areas and is more accessible to Area C than Area A. The size and placement of the boulders surrounding Area B suggest that it was created by natural forces and was not a constructed feature.

The generalized stratigraphic correlation (Figure 5) illustrates the importance of Area B for two reasons. First, because the boulders had created a dam, there was more accumulated stratigraphy in Area B than could be found anywhere else in the vicinity of the site; thus it provided the control and correlation for Areas A and C. Second, it was disappointingly devoid of cultural material. There were occasional tools and tool fragments found in Area B, but only in extremely small numbers and with no identifiable cultural context. On the other hand, the relative absence of cultural deposition provided more clear definition of the cultural deposits in the other two areas and provides meaningful contrasts within the context of a single site.

Area C is the largest portion of the site and had the deepest subsurface cultural deposits. This shelter faces south with the original ground surface sloping south and southwest. Upon discovery, this shelter had a maximum ceiling height of 30 cm and the amount of deposition was questionable. The shelter was formed in the outcrop itself and there were several large boulders that had separated from the outcrop and were permanently fixed approximately two meters outside the dripline. This

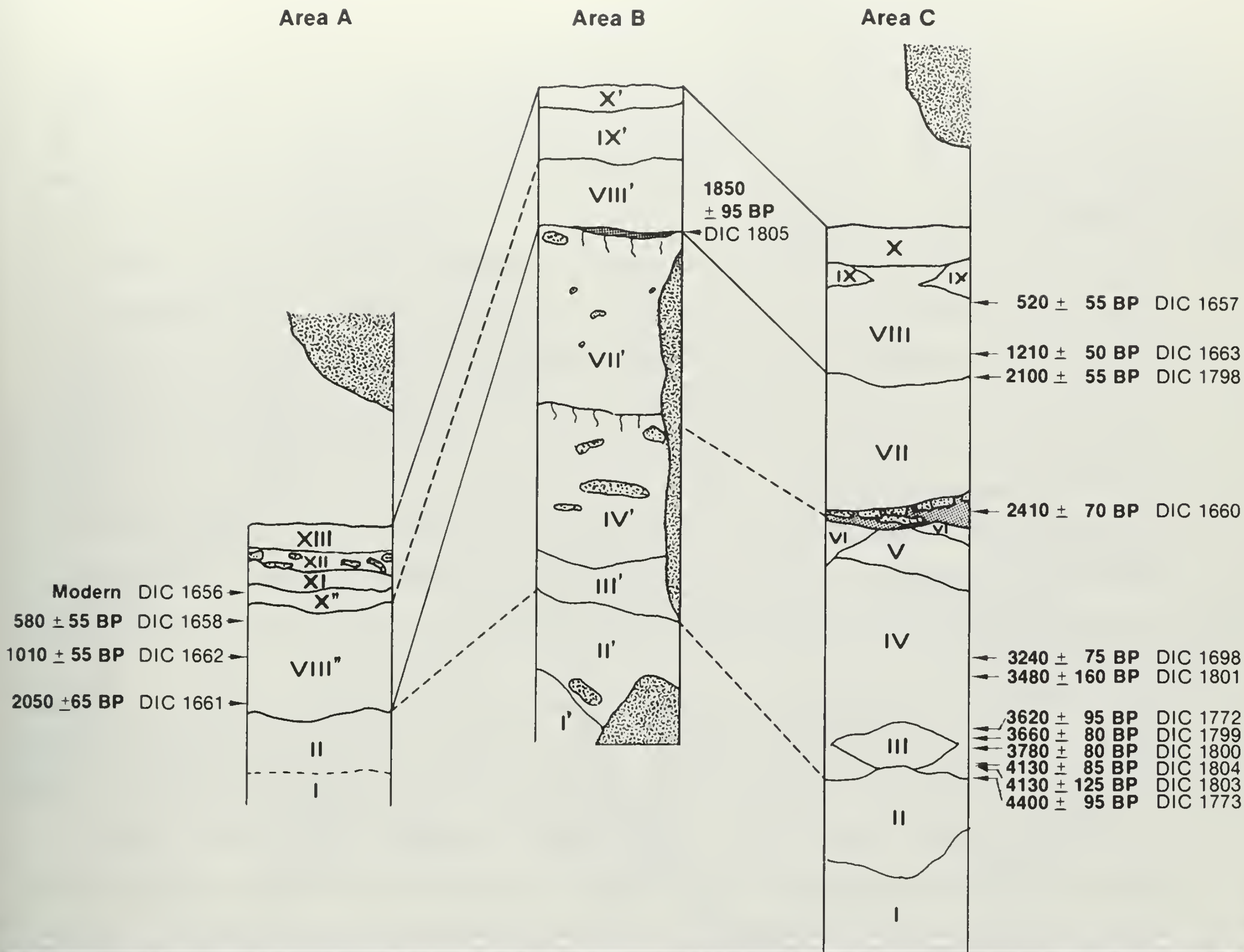


Figure 5.
Generalized stratigraphic profile of occupation areas with radiocarbon dates and inferred correlation.

sandstone

charcoal

fortuitous boulder placement permitted the creation of a level surface across the entire span of the shelter for occupation, and at the same time prevented erosion of the accumulated cultural and natural deposits. The anticipated trash midden was absent at Area C. Presumably, all refuse was deposited outside the southern boulder alignment where it was subject to erosion and decomposition. Area C had a surface area of approximately 35 m^2 which covered all of the intact subsurface cultural remains. With the addition of a -3 line to the plan map for Area C (Figure 6), the grid system covered all of the area. Area C developed into a much larger excavation project than anticipated. This was attended with all of the field archaeologists' nightmares of relocating the backdirt pile, moving boulders with heavy equipment and re-establishing and reconciling the grid system. Such pleasures as this were compounded by the fact that it was winter: wet, cold and windy.

A synopsis comparison of the three areas is that Area A was the smallest, owing principally to the interior space limitations and exposure to erosional factors. Area B contained the smallest surface area and was the most exposed. Area C was the largest and most complete in terms of natural and cultural remains. There were no radical differences between the areas as far as the natural or cultural deposits were concerned. It is apparent that the three areas were all part of a single site. Not all of the three areas were used during all of the occupations. Also, Areas A and B seemed to have lost some of their elements through natural decomposition and exposure to the elements.

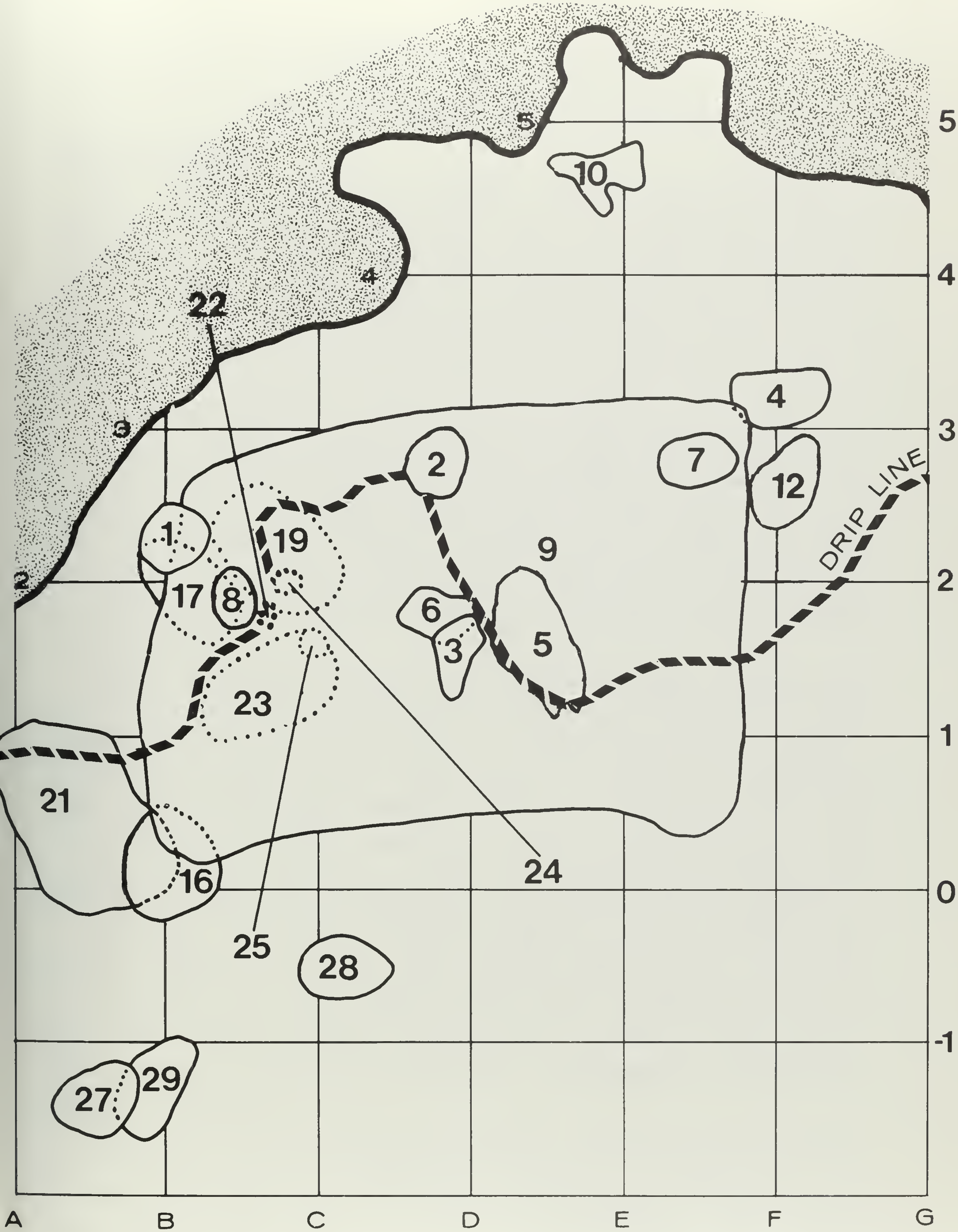


Figure 6.
Superimposed planview of Area C features.

METHODOLOGY

John Gooding and Wm. Lane Shields

Test Excavations

The controlled collection of surface artifacts on a site which is protected by its physiographic setting, such as a rockshelter, typically yields little information concerning subsurface cultural manifestations. Thus, subsurface testing attempted to establish the data necessary to evaluate more fully the significance of the site. This testing of the depth and extent of subsurface integrity proved useful in directing the course and scope of further work.

Testing was carried out with shovels and trowels and the material was dry screened through a standard 1/4" mesh hardware cloth shaker screen. When deemed justified, material was screened through 12 x 12 hardware cloth nestling box in the one-person shaker screens. When appropriate, dental picks and small brushes were used to excavate, and all samples were bagged and labeled for analysis in the laboratory. Units were dug in arbitrary 10 cm levels and measured below the present ground surface from the southwest corner of each unit.

Area A was tested soon after the site was recorded. Owing to its downslope position and relatively level surface, the southern portion of the overhang, an alcove area, was chosen as the area most likely to contain a complete stratigraphic record of occupations (see Figure 5). These factors suggested that only slight degrading of cultural occupation strata would have occurred through sheet washing and other erosional processes. Since this area is also peripheral, if significant deposits were uncovered, they would be impacted only minimally prior to investigation through excavation.

Two adjacent 1 m^2 units, located partially under the overhang, were dug until bedrock was exposed. This represents approximately 5.25 percent of the surficial area in this portion of the site. Although little cultural depth was uncovered and few artifacts were encountered, the imminent destruction of the site and the BLM District Archaeologist's recommendation led to full excavation.

Areas B and C were tested simultaneously in the fall of 1979, utilizing the same datum. Area B was sampled by a total of six test units: two contiguous 1 m^2 units in the southwest, three adjacent 1 m^2 units in the center of the area, and a 1 m^2 unit to the northeast. This diagonal

effectively sampled approximately 18.75 percent of the surficial area of this portion of the site. The northeasternmost unit was placed so as to determine whether or not the overhang visible in Area C extended into the subsurface of Area B. Numerous large sandstone boulders forced abandonment of the excavation effort on this unit by the second 10 cm level. The other two clusters of units, although not deep, yielded few artifacts; activity in this area was halted temporarily, since Area C proved to contain much more evidence of a wide variety of activities.

Area C was sampled originally by a total of seven test units, which covered approximately 12.25 percent of the surficial area. Later, a backhoe trench 4 m long was placed in the extreme eastern portion of the site in an attempt to interpret the stratigraphy being uncovered in excavation units. Peripheral placement minimized destruction of any subsurface cultural occupation. This activity raised the total area tested in Area C to 15.75 percent. Much later, a second backhoe trench was placed parallel to the overhang to examine the slopes in front of the overhang where a midden might be located. This trench covered approximately 20 m^2 additional area, of which 9 m^2 were located in that portion of the site determined to be intact, bringing the total area sampled in Area C to 31.5 percent.

The original test units included two contiguous units in the eastern portion of Area C. These formed a trench perpendicular to the overhang and terminating just inside it. The eastern wall of Feature 9 (see Figure 6) was exposed in this trench. The remaining five units were placed to the west in a 2 m wide trench extending under the overhang. These units yielded four projectile points and Features 1 and 2.

In summary, Area C showed such promise in comparison to already excavated Area A and the tested Area B, that efforts were concentrated on Area C, where significant subsurface remains appeared in every test unit. The overall testing of the site represents coverage of 20.5 percent of the surficial area determined to contain intact subsurface cultural deposits.

Excavation Procedures

In Area A, a datum was placed west of the area to be excavated and a secondary datum was placed among some boulders at 2N/8E (see Figure 4). A Brunton compass and a 30 m fiberglass tape measure were used to lay out and stake a grid of 1 m^2 units based on magnetic north. This grid system

increased numerically both north and east of the datum; the southwest corner of each unit was that unit's designation. Initial mapping of this portion of the site was then completed. Units were excavated primarily with shovels, where space allowed and conditions permitted, and with trowels otherwise. The uppermost level was dusty and filled with sheep dung, which necessitated respirators and repeated breathers for the crew. This level was excavated most effectively with coal shovels and whisk brooms or trowels. Small trowels, dental picks and soft brushes were used whenever necessary. The lower, hard clays necessitated the use of small pick-mattocks, and large rocks were broken for removal with a standard size pick-mattock. These units had string and line levels to record depth in meters below present ground surface. The units were excavated in arbitrary 10 cm levels, but work followed natural levels whenever possible.

Areas B and C had the same datum, placed at AA/0 (see Figure 4), the third on the site. This was surveyed in as a Reference Point by a Colorado Department of Highways survey crew using a theodolite at 1570.3 m above mean sea level. A transit, level rod and two 30 m tape measures were utilized to grid the site into 1 m^2 units based on magnetic north and to map the entire site simultaneously. Alphabetical notation east and west and numerical notation north and south were used in Area C to distinguish the grid system from Area A. As work progressed, this grid was extended, necessitating the use of double, reversed alphabetical notation to the west, and negative numerical notation to the south. Similar tools were used here as were used in Area A.

Areas B and C had string and line levels to record distance in meters below or above datum and ground surface. The transit was used to record the more important levels/artifacts and to check periodically the line levels' accuracy. Units were excavated in arbitrary 10 cm levels, although when definite cultural levels/features were encontered, they were excavated as a level/unit. In November, 1979, a chessboard design of excavation was instituted to maximize the efforts of excavators and the collection of profiles, and to facilitate delineation of the complex stratigraphy. This strategy, combined with extensive laboratory analysis, permitted sorting of all cultural information into natural levels at a later date.

An extensive photographic record was kept. All excavators completed level forms for each level of each unit. A separate form was used for features. Field notes were also kept by the project director. All appropriate samples were gathered and labeled for further analysis.

Analytical Procedures

Analysis of the constituent elements of the site was carried out on a level by level basis. Constituent elements, such as lithics, faunal remains and pollen and carbon samples are separated by level, with the intention that the distinctions may be drawn in each of the areas of research of a stratigraphic level. Discussion of the methods of analysis for each of the constituent elements is included in its respective section. The Interpretations section of this report is an attempt to recombine those elements into meaningful assemblages.

PEDOLOGIC STRATIGRAPHY

Allen Kihm

The sediments at 5GF110 reflect an extremely local and confined sedimentary environment. Deposition occurred subaerially, with sediments being colluvial and eolian in origin, though at times strong cultural activities influenced depositional patterns. A description of the bedrock and its outcrop pattern will enable a better understanding of the constraints on sedimentation.

The rockshelter is formed by the uppermost sandstone layer of the Molina Member of the Wasatch Formation. The sandstone is well sorted, medium grained, moderately cemented, and gray to tan in color. Below the sandstone and forming the cavity for the shelter is a green mudstone with minor green sandstone lenses.

The resistant sandstones of the Molina Member tend to form shelves, with the underlying and overlying mudstones eroding away to form short (2-5 m) vertical faces. The mudstones are exposed only where protected by an overlying sandstone. Most often, sandy clay soils formed by weathering of the bedrock cover the mudstone outcrops. Overhangs are common owing to the alternation of soft mudstones with resistant sandstones. Most of the overhangs are small and shallow (less than 1 m high and/or deep), although they may extend for several tens of meters laterally. Only near the top of the Molina Member are the mudstone layers thick enough to allow the formation of sizable overhangs.

The sandstones weather in two ways. The dominant method is the slow, constant attrition of sand grains from exposed surfaces. The second method is more noticeable and important in the local depositional pattern of 5GF110. This is the weathering along joints and fractures, which causes the eventual separation of large blocks of sandstone. Several large blocks in front of Area C of 5GF110 have formed a dam for sediments. They have acted also to prevent erosion of the deposits within the shelter.

Level I

The mudstone bedrock is designated as Level I of the soil profile (see Figure 5).

Level II

Level II is a transition zone between the mudstone and the overlying cultural deposits. This unit is not depositional in origin; rather, it was formed by weathering of the underlying bedrock. Owing to bioturbation and percolation along mudcracks, minor amounts of sand and clay detritus, as well as a few isolated artifacts, are present in this level. This transitional zone varies in thickness, being thin in the more protected portions of the shelter and thickest beyond the overhang. A physical description of Level II is given in Table 1.

Level III

Levels III through IX, which comprise soil zone B, have several characteristics in common. Dominated by clay or silt and colored brownish-gray or grayish-brown, these levels are local in extent and show increasing induration downward.

Level III is a sandy silt with heavy caliche precipitation on pebbles and artifacts. The presence of some bedding structure in this level is indicative of hydrologic activity. In Area C, this level interfingers with Level IV. Level III is best developed at the west end of the excavation outside the overhang in Area C. It thins and becomes a lens enclosed within Level IV toward the eastern section of the excavation. A single carbon sample from the upper interface of Levels III and IV in Area C produced a date of 3480 $\pm$ 160 B.P. (DIC-1801). In Area B a level which appears to correlate with Level III is more ubiquitous. It was present in both test pits and occurred as a complete layer rather than as a lens.

Level IV

Level IV is the lowest major cultural level of Area C. Seven radiocarbon dates ranging from 4400 $\pm$ 95 B.P. to 3240 $\pm$ 75 B.P. were produced from this level (see Table 1 and Figure 5). The oldest date was from a carbon sample taken within the rockshelter directly on top of the transition zone (Level II). Five other samples were stratigraphically level with or below Level III. One sample from just below Feature 9 and at the top of Level IV yielded a date of 3240 $\pm$ 75 B.P. (DIC-1698). Bedding is evident throughout this level in Area C. Stringers of carbon staining attest to a strong

Table 1.
Physical description of soil zones by levels.

Soil Zone/Level	Area A	Area B	Area C
Soil Zone A			
Level XIII	Unconsolidated layer of sheep dung mixed with windblown sand. 10YR 6/2, light brownish-gray.	Absent	Absent
Level XII	Unconsolidated layer of sandstone rocks mixed with sheep dung and sand. 10YR 5/2, grayish-brown.	Absent	Absent
Level XI	Unconsolidated silty sand mixed with some sheep dung. 10YR 6/2, light brownish-gray.	Absent	Absent
Level X	Unconsolidated silty sand with abundant charcoal flecks. 10YR 5/3, brown. DIC-1656 modern.	Unconsolidated silty sand with undecomposed organic matter. 10YR 4/3, brown-dark brown.	Unconsolidated silty, fine to medium sand with large amounts of undecomposed organic matter. 10YR 5/3, brown.
Soil Zone B			
Level IX	Absent	Somewhat compact sandy clay with rootlets. 10YR 5/3, brown to 10YR 4/3, brown - dark brown.	Somewhat compact clayey sand, usually associated with a large rock, may be a leeward deposit. 10YR 6/2, light brownish-gray.
Level VIII	Unconsolidated silty sand with scattered charcoal and sandstone cobbles. 10YR 5/2, grayish-brown. DIC-1658 580 ± 55 B.P. DIC-1662 1010 ± 55 B.P. DIC-1661 2050 ± 65 B.P.	Compact, silty fine sandy clay with some caliche. 10YR 5/2, grayish-brown. DIC-1805 1850 ± 95 B.P.	Compact sandy clay with some caliche induration, first continuous layer below the top soil. 10YR 5/2, grayish-brown. DIC-1657 520 ± 55 B.P. DIC-1663 1210 ± 50 B.P. DIC-1798 2100 ± 55 B.P.
Level VII	Absent	Compact fine sandy clay with caliche induration, some weathered sandstone pebbles. 7.5YR 6/4, light brown.	Compact sandy clay with caliche induration, some carbon staining and charcoal flecks. 10YR 5/2, grayish-brown to 10YR 7/4, very pale brown. DIC-1660 2410 ± 70 B.P.

Table 1.
Physical description of soil zones by levels, (continued).

Soil Zone/Level	Area A	Area B	Area C
Soil Zone B			
Level VI	Absent	Absent	Compact silty clay with lenses of fine sand, caliche indurated mainly in back portion of shelter. 10YR 7/3, very pale brown.
Level V	Absent	Absent	Compact caliche indurated clay with some silt, confined mainly to the back of the shelter. 10YR 7/2, light gray.
Level IV	Absent	Compact fine sandy clay with heavy caliche induration, some sandstone cobbles present. 10YR 5/4, yellowish-brown.	Compact sandy silt with heavy caliche induration, some limonite pebbles and some charcoal flecks, main cultural layer below Feature 9. Interfingers with Level III. 10YR 5/2, grayish-brown. DIC-1698 3240 ± 75 B.P. DIC-1772 3620 ± 95 B.P. DIC-1799 3660 ± 80 B.P. DIC-1800 3780 ± 80 B.P. DIC-1804 4130 ± 85 B.P. DIC-1803 4130 ± 125 B.P. DIC-1773 4400 ± 95 B.P.
Level III	Absent	Compact very fine sandy clay with heavy caliche induration and weathered sandstone pebbles, very dispersed carbon staining. 10YR 4/2, dark grayish-brown.	Compact sandy silt with heavy caliche induration, caliche also present as a coating on artifacts, first occurrence of mudstone clasts in sediments. 10YR 6/2, light brownish-gray to 10YR 7/3, gray to very pale brown. DIC-1801 3480 ± 160 B.P.
Soil Zone C			
Level II	Compact sandy clay with caliche induration. 10YR 5/4, yellowish-brown.	Compact sandy clay with caliche induration. 10YR 5/2, grayish-brown.	Compact sandy clay with caliche induration. 10YR 6/2, light brownish-gray to 7.5YR 7/2, pinkish-gray.

cultural influence in sedimentation. The unit is thickest at the east end of the rockshelter where a gap in the overlying rocks forms a natural drainage path. The sediments also thicken beyond the overhang limits, and runoff water appears to be the dominant agent of deposition. In Area B, the unit which correlates most closely with Level IV is the unit with the first heavy caliche induration. This unit is relatively thick but culturally sterile, perhaps because of the presence of large boulders which served to limit the available space in Area B when these soils were deposited.

Levels V and VI

Levels V and VI are present only in Area C. Both are found mainly in the back of the shelter or next to the sandstone face outside the overhang. Level V is comprised of clay that may be wind concentrated; no bedding is apparent. Level VI is alternating clay and sand, perhaps indicating periods of runoff and standing water in the shelter. Neither level held much cultural material.

Level VII

Level VII is a thick, widespread unit in Area C. The first cultural unit above Feature 9, it is bracketed by dates of 2410 ± 70 B.P. (DIC-1660) from Feature 9 and 2100 ± 55 B.P. (DIC-1798) from a sample taken from the Level VII-VIII interface. Given the thickness of the unit, Level VII was deposited rather rapidly. It is possible, judging from the position of the boulders in front of the rockshelter, that the fall of several of these boulders resulted in rapid deposition within the shelter. Since there was little or no apparent bedding in this unit, the probable dominant mode of deposition was wind activity, accompanied by a strong cultural influence. Charcoal flecks are common in this unit, although they tend to be dispersed. In Area B, the unit interpreted as a time equivalent of Level VII has two limiting interfaces. At its lower extent there is a rather evident facies change with root filling extending down into Level IV'. At its top is another interface (dated 1850 ± 95 B.P., DIC-1805), with charcoal-filled root casts extending down into Level VII'. Level VII' in Area B was culturally sterile.

Level VIII

Level VIII is the first cultural level represented in all three areas of the site. Caliche is present in Level VII in Areas B and C; in Area A, perhaps because of its more protected nature, the soil is compact but no caliche is present. This level represents a time of heavy occupation based on the number of features preserved. Of note is the fact that the rockshelter in Area C was, by this time, filled about two-thirds with sediment, while in Area A the rockshelter was still open. The two areas had approximately the same amount of clearance at this time. Area B, which is dominated by boulders below this level, was filled to the point where a larger space between confining rocks was present. The three areas were probably of equal suitability for habitation. Seven dated carbon samples from this level range from 520 $\pm$ 55 B.P. to 2100 $\pm$ 55 B.P. (see Figure 5). This is the youngest cultural level at the site, where wind and cultural influences appear to have been the dominant depositional factors.

Level IX

Level IX appears to be present in Areas B and C, although the units in the two areas may or may not be synchronous. In Area C, Level IX is found next to large rocks. It may have developed as a leeward, windblown deposit, most probably time transgressive. In Area B, Level IX' is more widespread. It appears also to be windblown.

Levels X-XIII

Levels X-XIII comprise soil zone A. Level X is present in all three areas, where it is the topsoil in Areas B and C, containing modern organic matter together with the cultural material which is eroding out. In Area A, a carbon sample taken from the Level X'' produced a modern date (DIC-1656).

Levels XI, XII and XIII are present only in Area A. They are related to local historic sheep grazing activity, with the animals using the overhang for shelter.

OCCUPATIONAL STRATIGRAPHY

John Gooding

A total of ten pedologic levels are defined in Area C (above) and are correlated with the levels in Areas A and B (see Figure 5). They are numbered consecutively from the bottom to the top. Within these levels are cultural deposits that were static (features) and dynamic (artifacts). The analysis of these types of remains will follow. However, at this point, it is useful to understand the general relationship of these elements to the stratigraphy. The radiocarbon dates and their placement in the various levels provide the first indications of the prehistoric occupations at the site. All of these occupations are separated from one another on the basis of erosional unconformities, structural differences in the deposits or outright cultural remodeling, as in Level VII, Feature 9.

There were few levels that displayed unique cultural remains. The overriding characterization of the assemblages is that the variations were based more on degree than on kind. The vertical spread of culturally diagnostic materials from their presumed level of deposition to their subsequent level of discovery is addressed as a factor of natural forces, and is equalized by radiocarbon dates and recognized point styles.

While the fact that there was only one culturally sterile level argues for nearly continuous occupation of the shelter, that observation alone does not account for the depositional characteristics of the geology and the rates implied in the pedologic stratigraphy. The only single events that can be identified are the dated hearth features and the habitation floor (Feature 9). Thus, the cultural identifications that are provided below are most firmly fixed on the basis of those dates, and the dates that are identified as level dates are arguments for occupation relying on projectile point styles and stratigraphic placement of the sample.

The modern date (DIC-1656) located in Area A in the upper portion of Level X is consistent with the stratigraphy in that Level X, in Areas B and C, was the surface level. Levels XI-XIII in Area A are believed here to be the result of sheepherding activities. The 580 $\pm$ 55 B.P. (DIC-1658) date from the upper portion of Level VIII in Area A and the 520 $\pm$ 55 B.P. (DIC-

1657) date from the upper portion of Level VIII in Area C are considered to be indicative of an occupation.

The date 1010 ± 55 (DIC-1662) from the middle of Level VIII in Area A and the date 1210 ± 50 B.P. (DIC-1663) from the middle of Level VIII of Area C are believed to be mutually reinforcing and indicate an occupation. The 2050 ± 65 B.P. (DIC-1661) date and the 2100 ± 55 B.P. (DIC-1798) date from the base of Level VIII and the 1850 ± 95 B.P. (DIC-1805) date from the base of Level VIII in Area B indicate an occupation utilizing all three areas at that time period.

The 2410 ± 70 B.P. (DIC-1660) date from the base of Level VII (the floor of Feature 9) is considered to be the original occupation of that feature.

The samples 3240 ± 75 B.P. (DIC-1698) and 3480 ± 160 B.P. (DIC-1801) are thought to represent an occupation period for the upper Level IV. Samples dating 3620 ± 95 B.P. (DIC-1772), 3660 ± 80 B.P. (DIC-1799) and 3780 ± 80 B.P. (DIC-1800) were retrieved from the lower portions of Level IV where Level III is indicated only as a set of lenses. They are believed to be indicative of an occupation period. Three samples, 4130 ± 85 B.P. (DIC-1804), 4130 ± 125 B.P. (DIC-1803) and 4400 ± 95 B.P. (DIC-1773) are believed to represent the earliest occupation of the rockshelter. It is important to note that the 4400 year date is contact with Level II, keeping in mind that Level III is a discontinuous level (see Figure 5).

The dates listed below (Table 2) are a compilation of the three areas and are discussed briefly respective to their area and placement. The implication of those relationships will follow.

		AREAS		
		A	B	C
Occupation 1:	4400-4100 B.P.			X
Occupation 2:	3700-3600 B.P.			X
Occupation 3:	3400-3200 B.P.			X
Occupation 4:	2410-2400 B.P.			X
Occupation 5:	2100-1850 B.P.	X	X	X
Occupation 6:	1210-1010 B.P.	X		X
Occupation 7:	580-520 B.P.	X		X

Table 2.
Occupation of Sisyphus Shelter by area.

Briefly, then, the stratigraphic/radiocarbon data suggest the possibility of seven occupations at the rockshelter. These occupations incorporated other areas of the site at different times.

There are two important considerations in defense of this occupation interpretation. First, the deposits are stratigraphically uniform in their depositional context. In other words, the oldest dates are at the bottom and they progress toward the youngest dates at the top. Second, there are several features in clear archaeological context with level dates, when the features themselves did not provide dates. Figure 7 is a case in point. It illustrates the placement of the features in Level IV, where Features 19, 23 and 25 are clearly at the bottom of the level and did not contain enough charcoal to be dated. Consequently, the context of these features with the earliest date of Level IV is consistent.

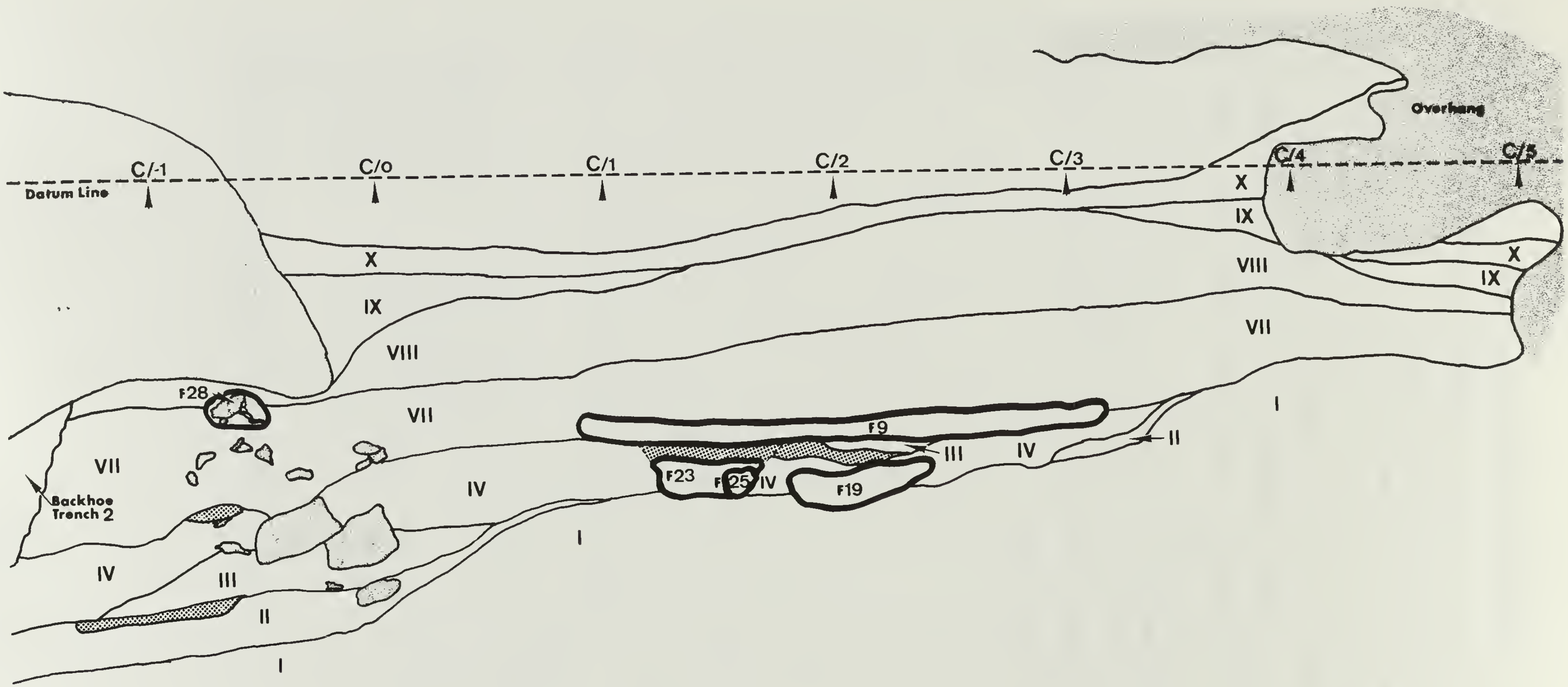
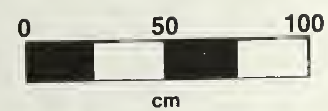


Figure 7.
Area C profile of C line.
C/-2 to C/5, south to north.

sandstone charcoal



FEATURES

John Gooding and Wm. Lane Shields

During the excavation of 5GF110, 32 plausible features were observed in the cultural fill. As work progressed, it became apparent that several of these designations were inappropriate and six of them were dropped. Two of these were incorporated into Feature 9 and the remaining four were deleted because of lack of diagnostic characteristics. To minimize confusion, the deleted feature numbers were not reassigned. Thus, a total of 26 features are discussed below. Four of these were internal elements of Feature 9, the habitation. Area A contained Features 31 and 32. Area B contained Features 15 and 30. The remaining 22 features were contained in Area C; unless noted otherwise in the text, all features were located in Area C. Locational information for Area C features is illustrated in planview in Figure 6. A list of features in numerical order is presented in Table 3; this listing does not represent the internal stratigraphy. Included in Table 3 is information as to location, stratigraphic level, dimensions and typological designation of each feature.

Stratigraphic interpretations of cultural deposits in rockshelters are difficult to present clearly. They are subject to misinterpretation if they are not approached with a great deal of care in the manipulation and presentation of the data. This section presents one of eleven vertical profiles, three superimposed profiles, one planview and one table. The purpose here is not to be redundant in the presentation of the cultural stratigraphy, but to allow the reader several possible perspectives to view superpositioning of the cultural remains. As one can see by scanning the actual maps versus the stylized maps and tables, a picture helps to clarify cultural relationships. Various feature placements in profile give a considerably different perspective when presented in planview, or when the profile is changed from north/south to east/west. In archaeological sites of intense occupation such as a small rockshelter, the cultural deposits that are laid down are subject not only to the natural weathering process, but also to intensive relocation and modification because of the limited area of the site. For example, Feature 9, the habitation, is a significant

Table 3.
Description and location of features from 5GF110.

Feature Number	Area	Level	Diameter (Max.)	Depth (Max.)	Category
1	C	VIII	42 cm	10 cm	Slab-lined Basin Hearth
2	C	X	39 cm	13 cm	Simple Basin Hearth
3	C	VII	50 cm N/S 38 cm E/W	4 cm	"Adobe" - associated with Feature 9
4	C	VIII	48 cm	8 cm	Pit (Ash)
5	C	VII	100 cm N/S 30 cm E/W		"Adobe" - associated with Feature 9
6	C	VII	47 cm	9 cm	Simple Basin Hearth
7	C	VIII	42 cm	7 cm	Simple Basin Hearth
8	C	VII	36 cm	6 cm	simple Basin Hearth
9	C	VII	3.0 m N/S 2.5 m E/W		Habitation
10	C	VII	31 cm	17 cm	Pit (Storage)
12	C	IV	30 cm	3 cm	Boulder Surface Hearth
15	B	VIII'	86 cm	20 cm	Outline of Stones Surface Hearth
16	C	VII	38 cm N/S 50 cm E/W	44 cm	Simple Basin Hearth
17	C	IV	75-110 cm	11 cm	Slab-lined Basin Hearth
19	C	IV	80 cm	29 cm	Simple Basin Hearth
21	C	IV	86 cm	15.5 cm	Outline of Stones with Reflector Basin Hearth
22	C	IV	23 cm N/S 20 cm E/W	15 cm	Tripod Post Mold
23	C	IV	1 m	24 cm	Cluster of Stones Basin Hearth
24	C	IV	25 cm N/S 23 cm E/W	10 cm	Tripod Post Mold
25	C	IV	25 cm N/S 23 cm E/W	10 cm	Tripod Post Mold

Table 3.
Description and location of features from 5GF110, (continued).

27	C	IV	60 cm	15 cm	Outline of Stones with Reflector Surface Hearth
28	C	VIII	70 cm	38 cm	Cluster of Stones Basin Hearth
29	C	IV	61 cm	15 cm	Outline of Stones Basin Hearth
30	B	VIII'	60 cm	12 cm	Cluster of Stones Surface Hearth
31	A	VIII''	61.25 cm	15 cm	Simple Basin Hearth
32	A	X''	56 cm	10 cm	Simple Basin Hearth

architectural feature, and the relative sparseness of artifactual remains suggests that the habitation had experienced a good deal of "housecleaning" during its occupation.

Figure 6, the superimposed planview of the features in Area C, defines the relative placement of the features to one another in the rockshelter, their relative sizes, the maximum extent of the back wall and the dripline. For a small rockshelter these characteristics are probably as important in their interpretive value of the features as the construction techniques or their contents. With regard to placement of the 14 hearths in Area C, seven, or 50 percent, are located at or within 5 cm of the dripline, with four (29 percent) outside and three (21 percent) inside the dripline. Without making speculations as to the junction of specific hearths, it is obvious that the occupational strategy within Sisyphus Shelter was regular and definable. One would presume that some hearth features functioned as cooking fires, while others may have provided a secondary function of warmth. Hypothetically, one might assume that those hearth features behind the dripline served in the function of warmth. It is interesting to note in this figure that there was not any representation of cache features along the back wall of the shelter, although Feature 10 may have been a cache feature. It was excavated into the sterile mudstone; however, it was devoid of cultural remains and was filled with packrat debris. The mudstone was of such compact character that it would have been extremely difficult for a rodent to excavate. It may have served temporarily as a cache and was later occupied by rodents. The cultural interpretations of its function are open to question.

It is useful to consider Feature 9's locaton, with 50 percent in front of the dripline and 50 percent behind it, given the fact that the feature was excavated into Level VII and was still away from the back wall and in no way filled the available area of the rockshelter. It is apparent that there was some selection process in the size and placement of the feature. Presumably, its moderate size was in the interest of conserving artificial heat. The complement to this is the placement of the structure, which would allow maximum ventilation and solar exposure of the structure; this would have not been available if the structure was placed against the back wall.

Features 22, 24 and 25 did not fit the regular pattern of features in Area C. They were identified as post molds through trowel excavation. They

were 15 cm in diameter and presented a slanted profile toward the mid-distance between the opposing two molds. Their pattern formed a triangle. Were it not for the fact that these post molds were dug into the mudstone, this feature probably would have been missed entirely. Owing to the fact that without preservation of the wood, post molds could not be distinguished from the cultural fill. It is presumed that the tripod was some type of storage feature. An intensive search was conducted to identify related hearth features, either in or beside these post molds. While there was no hearth feature within the boundaries formed by the tripod, three possible candidates are Features 23, 19 and 17. The exact functional relationship of such possibilities is not known.

Analysis of various types of features and their stratigraphic provenience reveals several things. The Simple Basin Hearth was present in all levels. It was the only type of hearth found in the uppermost Level X. It was, however, also the hearth type of the oldest feature (Feature 19) at the site. The related Features 7 and 4, from Level VIII were also Simple Basins (although Feature 7 was a hearth and Feature 4 an ash pit), as was Feature 31. Interestingly, the dates from Features 7 and 31 strongly suggest unrelated or non-overlapping occupations. The smallest of the Simple Basin Hearths is Feature 8 (diameter 36 cm, depth 6 cm). The largest is Feature 19 (80 cm diameter and 29 cm depth). The average dimensions of all these features is 51.6 cm in diameter and 12.7 cm in depth.

The three Cluster of Stones Hearths were found in Levels VIII and IV. Features 28 and 30 are in Level VIII and may suggest a single occupation.

Figure 8 is a superimposed profile of Area C features. This is a composite figure that illustrates the relative stratigraphic position of all of the features. Designation of the E Line is used strictly to define the outline of the overhang and the bedrock. This figure is most useful in understanding the depositional sequence in the cultural deposits as they accumulated in the rockshelter. Since it is possible to use only a single line to indicate the outlines of the features, this figure can be useful only in a relative sense. For example, the relationship between Features 8 and 9 in this figure places Feature 8 above Feature 9. This is an anomaly of the superimposition of the sideview without perspective. Reference to Figure 9 bears out the relationship of Feature 8 to Feature 9 at the west

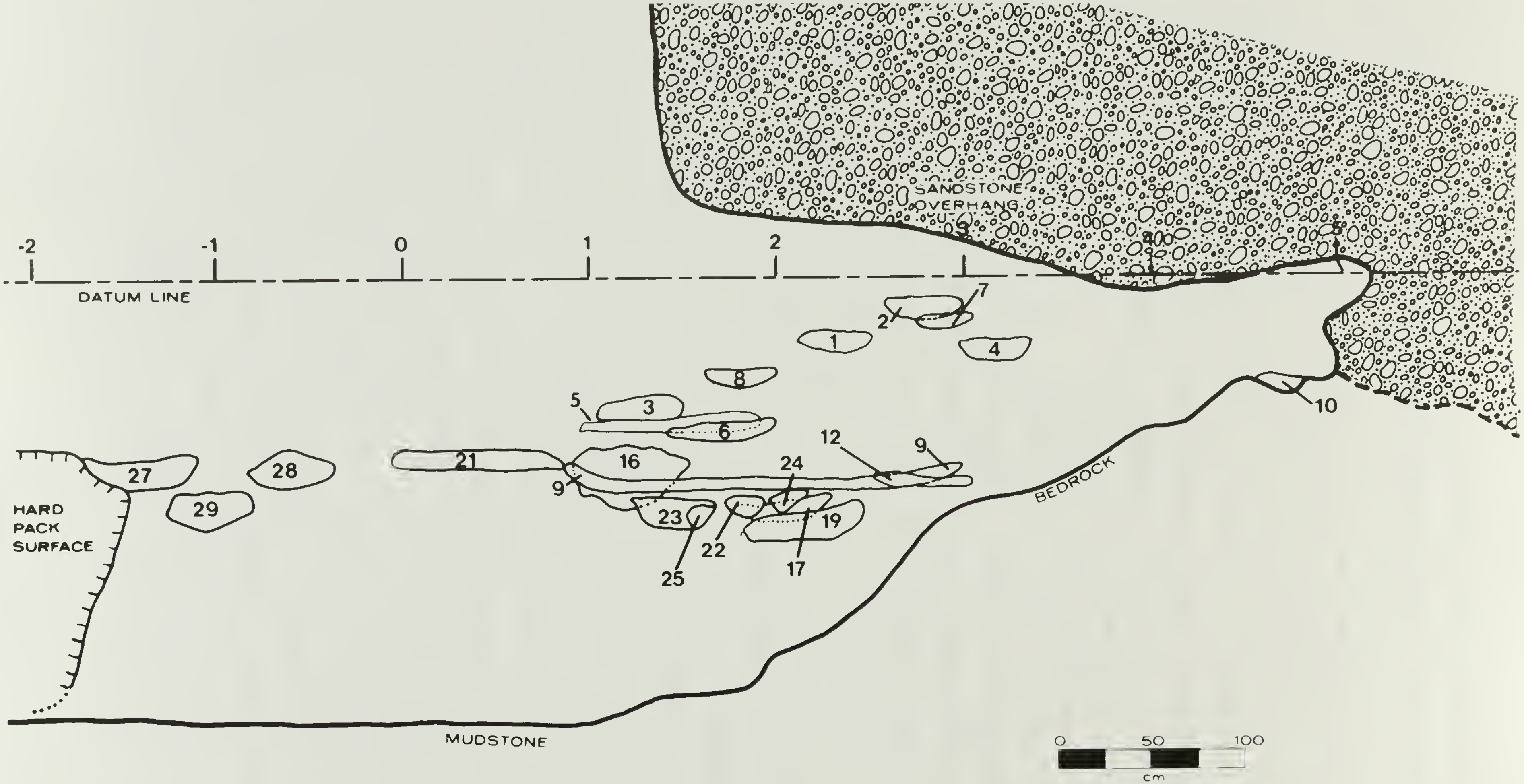


Figure 8.
Superimposed profile of Area C features on E line, view west.

end of the habitation. Therefore, it should be kept in mind that for interpretations of feature relationships, Figures 7, 8, and 9 should all be examined for a clear understanding of the placement of the features.

Reference to the Pedologic Stratigraphy, this volume, and radiocarbon dates for levels and features demonstrates that there was one major remodeling within the confines of Area C, which was part of the construction of Feature 9. Figure 8 provides perspective of the deposition by showing that all of the features were constructed with relationship to the ground surface at the time of occupation. Given the placement of the ceiling of the overhang, deposition in the rockshelter rendered it less useful for occupation as time progressed. This is borne out by the relative number of features at or behind the dripline in the lower levels, as opposed to those outside the dripline. The absence of features outside the dripline in the upper levels is most likely due to natural weathering processes and the location of ground surface at the time of excavation. Needless to say, the distance between the ground surface and the ceiling of an overhang is a critical factor in determining a functional occupational area. In view of that, it is noteworthy that Features 1, 2, and 7 even existed at this site. It is apparent that as the rockshelter was filled, it was, in fact, used less. This is apparent by the number of features located more than one meter below datum, as opposed to those less than one meter below datum.

Figure 9 illustrates that the left, or west, end of the shelter was used more intensively than either the middle or the east end. Referencing Figures 7 and 8 and noting the feature numbers and their locations, it is apparent that the west end of the shelter was the most repeatedly occupied through time. Here again, it is presumed that this is a result of relationships of ground surface to the ceiling of the overhang. The best examples of this are Features 24, 17 and 19. It is apparent that features in the center and to the east end of the rockshelter show a more general use of the shelter area. In the final occupations, use of the shelter was centered back toward the west end. In this regard Feature 9 and its subfeatures are viewed as an anomaly and are not representative of the regular occupational pattern at this or other shelters in the area.

The features are divided into four typological categories based on inferred function: Hearth, Pit, Tripod and Habitation. Following the

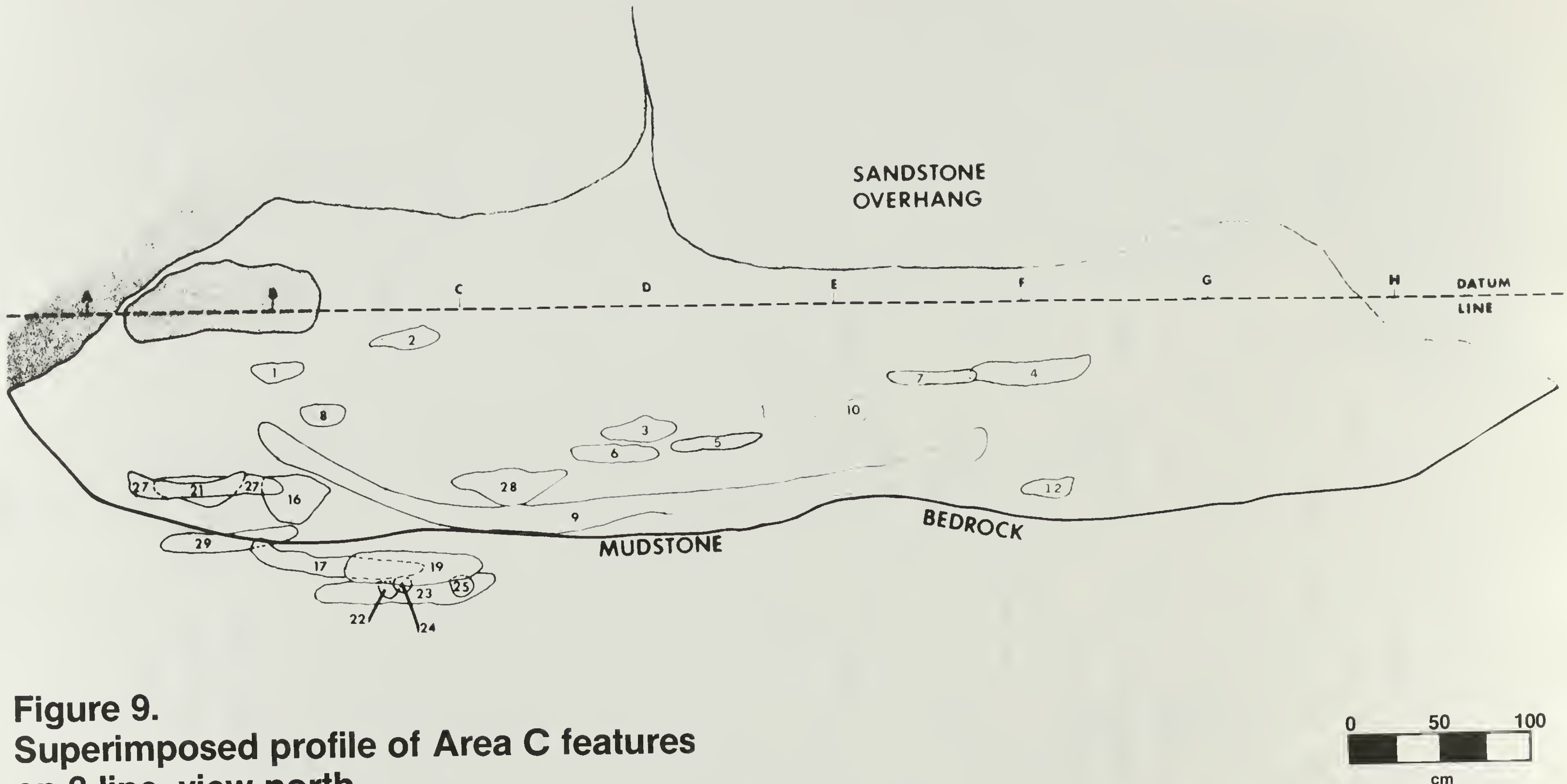


Figure 9.
Superimposed profile of Area C features
on 3 line, view north.

description of the features is a discussion of the stratigraphic and functional relationships among the features.

Hearths

Of the four typological categories, hearths comprised the most diverse group, accounting for over 69 percent of the features (18 out of 26). Hearths are divided into two general groups on the basis of construction technique: surface hearths and basin hearths. These can be subdivided further on the basis of internal elements (see Table 2).

The basic distinction between the basin hearths and surface hearths is simply the excavation of a pit for the fire. It is useful to note that the ratio of number of surface hearths to basin hearths at 5GF110 was 4 to 14. Presumably the basin hearths were used over a slightly longer period of time and/or for more specific functions. Ideally, a basin hearth would conserve fuel and direct heat, whereas the surface hearth may represent a more expedient effort. It should be noted that the addition of stones and/or reflectors would increase the efficiency of a hearth.

The basin hearths created more complex stratigraphic problems because they were generally intrusive into lower levels that also contained evidence of occupation. It is interesting to note that there was a higher percentage of basin hearths at this site than at open sites that have been excavated in the region. For example, at Vail Pass Camp (Gooding 1981) the surface hearths comprised the greatest percentage of hearth types.

Surface Hearths

The four types of surface hearths, from simplest to most complex, are: boulder, cluster of stones, outline of stones, and outline of stones with reflector. These types are defined and described below.

The Boulder Surface Hearth consisted of an open fire on the habitation living surface with a large rock placed in the center of the fire. Presumably this rock was for heat retention and not to put out the fire, since the recovered charcoal was well consumed and the rock scorched and reddened. Boulders were easily accessible in the shelter, making this the simplest hearth type at 5GF110. No construction was required prior to the use of the hearth.

Feature 12 was the sole example of this type of hearth. The slab of rock in the center of the hearth had a slightly smaller diameter than the extent of the irregularly oval charcoal stains. A sample of the charcoal yielded a radiocarbon date of 3240 ± 75 B.P. (DIC-1698).

The Cluster of Stones Surface Hearth required one relatively simple construction step before utilization: the collection of appropriate stones to dump into the fire. This hearth type contained an unarranged jumble of rock within the hearth area, which probably served a heat retention function.

Feature 30, located in Area B, was the sole hearth of this type. This roughly circular fire hearth was filled with charcoal-stained river cobbles, 17 small unmodified sandstone slabs and a handstone fragment. The hearth had been positioned on a large, flat sandstone boulder. The function of the hearth did not appear to be heat treatment of raw lithic materials, nor was there any direct evidence (e.g., carbonized seeds) of the stones being used to heat food. Rather, it appeared that heat retention was its primary purpose.

Outline of Stones and Outline of Stones with Reflector Surface Hearths were similar. Both required collection of stones of a similar size and shape and the careful placement of the stones. In both cases, the stone outline is assumed to have functioned both for heat retention and for fire containment. The outline may also have been utilized prehistorically in a fashion similar to campfires today: the propping of cooking vessels out of as much direct contact with flame as possible. The addition of large boulders utilized as reflectors directed heat back across the fire and into living areas. This type of hearth required adjustment of living and working areas to the reflector.

Feature 15, located in Area B, was a large, roughly circular outline of stones surface hearth. It had an irregularly formed outline around the upper perimeter and no internal stones. A radiocarbon date of 1850 ± 95 B.P. (DIC-1805) was obtained from material within the feature.

Feature 27 was an outline of stones with reflector surface hearth. Although several of the sandstone cobbles were absent in the northwest portion of the feature owing to the placement of the second exploratory backhoe trench, its roughly circular character was still easily discernible.

Basin Hearths

As noted above, the basin hearths required a slightly more complex construction technique than the surface hearths. Basin hearths can be subdivided into five categories on the basis of complexity: simple basin, basin cluster of stone, basin outline of stones, basin outline of stones with reflector and slab-lined basin. The first four were similar in definition to the surface hearths, with the addition of the construction of the basin. The slab-lined basin hearth required the construction of a pit, the collection of a specific rock type (the slabs were relatively uniform in terms of thickness, width and breadth), and careful placement of the slabs, probably with some adjustment of the pit itself for more secure footing of the slabs. This hearth served to reflect heat from the fire up rather than dissipating heat through the earth; it also retained heat. In contrast, the simple basin hearth was manufactured with one construction step, which was simply the excavation of the pit for the fire. This particular type of hearth is not only the most numerous but also is evident in almost all periods of occupation in the shelter.

The Simple Basin Hearths, representing 41 percent of the hearths, was the largest category and included Features 2, 6, 7, 8, 19, 31 and 32.

Feature 2 was a circular hearth containing charcoal. However, the sample collected was too small for radiocarbon analysis.

No artifacts were associated directly with Feature 6. This feature was an irregularly oval basin.

Feature 7, an oval hearth, provided sufficient charcoal to complete a radiocarbon analysis which yielded a date of 1210 ± 50 B.P. (DIC-1663).

Feature 8 was a circular hearth. It appears to be part of the Feature 9 habitation (Figure 10).

Feature 19 had a heavily oxidized and compacted central portion, and loose, charcoal-stained fill surrounding it. It was oval shaped.

Feature 31, a roughly circular basin located in Area A, was associated with a charcoal concentration 25 cm northeast. The charcoal appeared to have been scooped out of the basin and deposited on the adjacent living surface, since the feature itself contained very little charcoal. The charcoal sample yielded a radiocarbon date of 1010 ± 55 B.P. (DIC-1662).

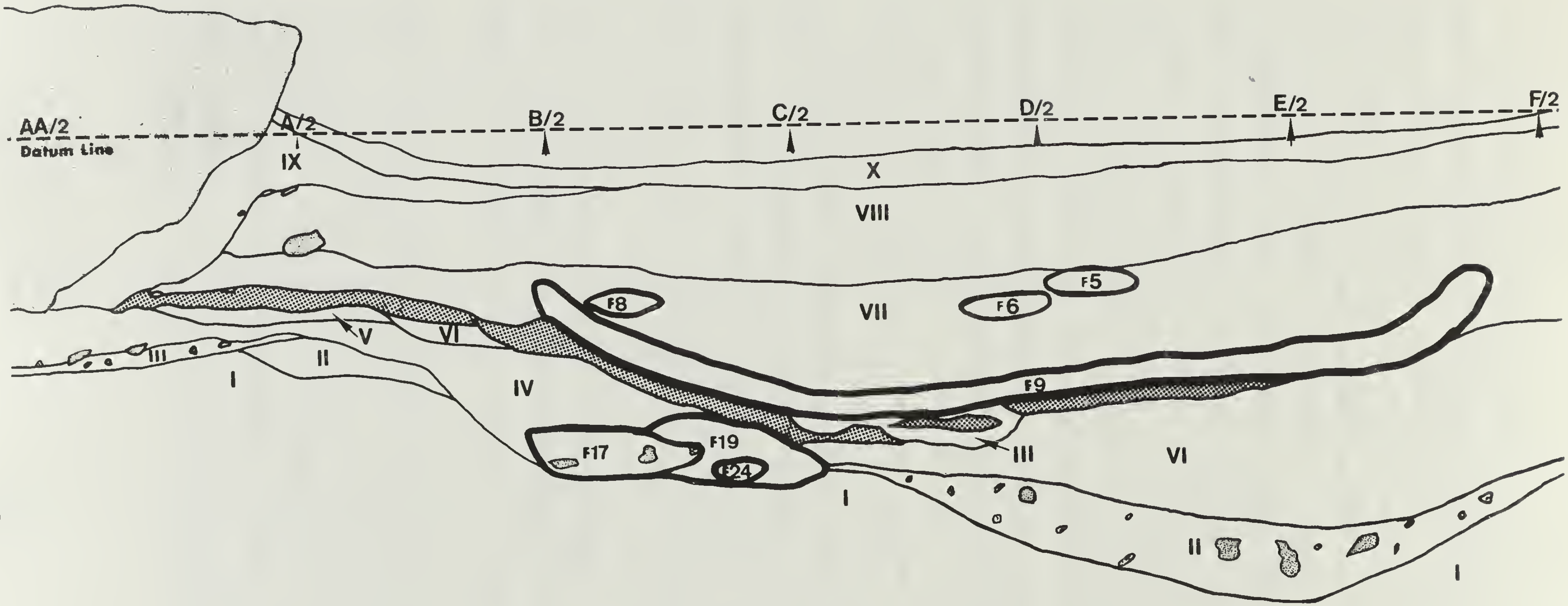
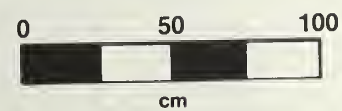


Figure 10.
Area C profile of 2 line.
AA/2 to F/2, west to east.

sandstone charcoal



Feature 32 was also located in Area A. No artifacts were recovered in direct association with this feature.

Cluster of Stones Basin Hearths consisted of Feature 23 and 28. Feature 23 was an irregularly circular hearth. The sandstone rocks and boulders that were embedded in the mudstone bedrock were incorporated into the hearth during its construction for further heat retention. The profile of this feature is shown on the C-line Profile (see Figure 6).

Feature 28 was located under a very large boulder and was not recorded until a backhoe dislodged the boulder during excavation of Backhoe Trench #2. A portion of the profile of this feature appears on the C-line Profile (see Figure 6).

Feature 29 is the sole Outline of Stones Basin Hearth.

The only Outline of Stones with Reflector Basin Hearth identified at 5GF110 was Feature 21 (see Figure 9). The base of several sandstone boulders incorporated into construction of the hearth are excluded in the dimensions of this feature (see Table 2). A number of unmodified sandstone cobbles (15.3 kg) comprised the outline of the hearth.

Features 1 and 17 are both Slab-lined Basin Hearths. Fourteen kilograms of flat, charcoal-smeared sandstone slabs were extracted from Feature 17. The loosely packed fill was oxidized to an orange color that extended beyond the slabs.

Pit

The next major category of features is the pit, which was a depression with no indication of being utilized for fire containment. This feature type is comprised of Features 4 and 10.

Feature 4 was designated as an ash pit with nearly vertical walls and a flat bottom. The fill in the pit did not contain much charcoal, nor did the walls appear to have been in contact with heat. Its location on the eastern edge of the shelter near the back of the by-then low shelter was distinctly peripheral.

Feature 10 was designated as a small storage pit and had been modified by a small rodent. To one side of the pit was a flat area constructed evidently at the same time as the pit. A rodent had enlarged the pit into a den lined with shredded juniper bark. This rodent activity was limited to

one side and was easily discernible from the prehistoric storage area. The original function of Feature 10 cannot be determined.

Tripod

Three small post molds (Features 22, 24, and 25) comprised the tripod category. Similar in size and shape, the features formed a rough circle or triangle and angled to a "point" toward the center. The post molds were not positioned to suspend an object (e.g., cooking vessel) over any of the hearths. The specific function of this feature remains unknown, although it is possible that it was used as a "backrest" similar to those used by historic aboriginal populations.

Habitation

The habitation category contains the major feature at the site, Feature 9 (Figure 11). Two features that are described as "adobe" puddles (Features 3 and 5) and two hearth features (Features 8 and 16) were subfeatures of Feature 9. Sandstone "foundation" walls were constructed to enclose three sides of this structure. One wall was placed across the front of the shelter and two side walls extended toward the back wall of the shelter.

During the excavation of Test Trench 4, the eastern edge of the structure was encountered more than one meter below the ground surface. The angle of the slabs and the irregular pattern of the slabs seemed to suggest roof fall from the shelter. However, artifacts recovered from between the slabs and the obvious character of the cultural fill above the slabs provided evidence of the architectural feature.

Feature 9 was a rectangular slab-lined habitation within the shelter with approximately 50 percent of the floor space under the dripline and the remaining 50 percent outside the dripline. Dimensions of the structure were 2.5 m x 3.5 m with the long axis of the habitation running the length of the shelter. All that remained of the feature was the floor and a lower portion of the west wall. The structure was shallow and saucer-shaped in profile (deepest in the middle and rising slightly to the edges). The slab-lined floor was laid on a prepared surface that was excavated into Levels VI, V and I. The slabs of the feature flooring varied from two to five centimeters thick. The slabs were neither trimmed nor prepared and were not

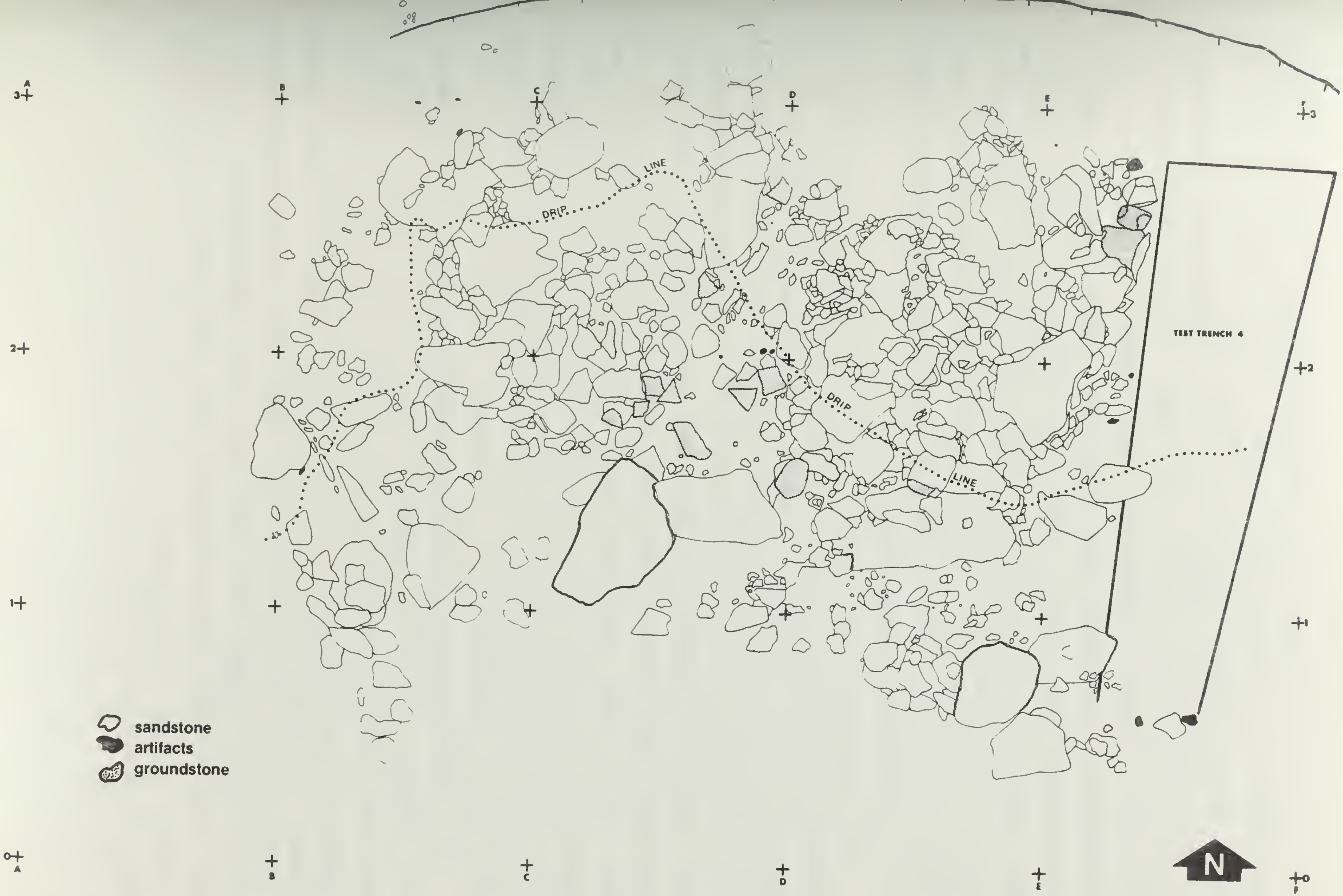


Figure 11.
Planview Feature 9, Area C.

laid in the prepared depression in any patterned manner. The edges appeared to be built up with several slab courses. Features 3 and 5, the "puddled adobe" features, appeared as pure clay discolorations.

The mapping of the habitation illustrated that the outline of the floor plan was defined independently of the shape of the floor space of the rockshelter and the conformation of the dripline. The dripline of the rockshelter was extremely irregular and raises numerous questions regarding the conformation of the upper walls. Neither roof beams nor superstructure were encountered during excavation. Also, there was no evidence of logs laid in place to suggest cribbing of the walls. The disturbance and cultural mixing of the levels and the disintegration of most of the fibrous remains precluded any solid evidence of postholes. There was some evidence of coursing of stone at the west wall.

The space between the structure and the back wall of the shelter was probably unused (see Figure 8). There was no obvious evidence of any entryway to Feature 9; however, based on the configurations of the slabs, it is hypothesized to have been either on the east or the south side. It is possible that the wall sections and roof could have been wattle and daub. It is equally possible that the structure could have had a lean-to roof. The rather small amount of puddled adobe opts for the latter suggestion. In the fill of the floor there was a great deal of charcoal and charcoal-stained earth, along with numerous flakes (see Material Culture, this volume). Metate fragments, indicated by shaded stone, are illustrated in Figure 11. The distance from the floor of the habitation to the ceiling of the overhang varied from 1.3 to 1.5 meters.

Aside from the architectural characteristics that identify this feature as a habitation, a brief review of some of the elements indicating functional activities provides proof that the feature is a habitation. Evidence of common household activities, such as tool production and tool caches, were evident from the floor material. This is borne out in the following Material Culture section that indicates that this feature produced the greatest frequency of tools, tool types and varieties of lithic materials. A tool cache was recovered from the feature in the form of numerous scrapers, all produced from the same material. Food preparation tasks are evidenced by groundstone.

Stratigraphic Relationships of Features

As indicated in the pedologic stratigraphy and the stratigraphical profiles, the weathering and cultural deposition of deposits in the shelter was uneven. Consequently, the stratigraphical relationships of many features are relative and/or are implied by their placement in the deposits and, in some cases, between different deposits in different areas of the shelter. The absolute age relationships are based, when possible, on the radiocarbon dates from features and levels. The implication here is that there was a definable cultural depositional pattern in all three areas, the most complete of which was in Area C. There were some discontinuities in all three areas and some levels contained large amounts of cultural deposits, while other levels contained few or none. For a more complete discussion of the levels, see Pedologic Stratigraphy, this volume.

Level IV

In terms of the features, deposits do not begin until stratigraphic Level IV, represented by seven hearths and one set of tripod post molds. From the level there are eight radiocarbon dates, six from the general level and two from the features. It is important to note that the oldest date, 4400 $\pm$ 95 B.P. (DIC-1773) is from the interface deposit at the base of Level IV, and that the stratigraphic position of the general level samples is continually higher as the dates become more recent. The general level dates, while they cannot be assigned specific features or artifacts, are definitely from cultural deposits and most likely represent charcoal scatter from the six undated features in the level. The relative consistency of the dates from the general level samples are consistent enough to support the presumption that Level IV represents a Middle Archaic occupation. It is noteworthy that Feature 21 is dated at 3480 $\pm$ 160 B.P. (DIC-1801) and Feature 12 is dated at 3240 $\pm$ 75 B.P. (DIC-1698). The integrity of the charcoal in these features is sufficient to assume that these are accurate dates. Furthermore, the sigma values of the general level dates are small enough to suggest relative integrity in those samples. The data suggest strongly one of two things: either Middle Archaic period hearth features were not of a standard type, or the classification of hearth types, i.e., stone clusters, outline of stones, etc., is spurious.

In terms of superpositioning within the level, it is important to note that the features that are dated (Features 12 and 21) are relatively high in

the level and are stratigraphically above Features 29, 23, 17, 19 and the tripod (Features 22, 24 and 25). Therefore, it suggests strongly that the latter features can be dated generally in the 4000-4400 B.P. range.

Occupations 1, 2 and 3 (see Table 2) are definitely the constituents of this level. In terms of thickness of the deposit, the date spread of over 1000 years is not unreasonable. Level IV was the thickest deposit in Area C. For artifact associations and relationships in this level, see Material Culture, this volume.

Levels V and VI

Levels V and VI are devoid of architectural remains. These pedologic units do not occur in Areas A and B. As Figure 10 depicts, Levels V and VI are both truncated by Feature 9. Since Feature 9 is also in direct contact with the parent sterile deposits, it is obvious that Levels V and VI were largely destroyed by the excavation prior to the laying of the Feature 9 floor. The almost total absence of cultural material from Levels V and VI, and the small size of the deposits immediately under the floor of Feature 9, indicate that the construction of the Feature 9 habitation constituted a major remodeling effort of the entire rockshelter. Since there are no clear cultural or radiocarbon associations for these levels, their occupation period cannot be defined clearly. The possibility does exist that the radiocarbon date for the floor of Feature 9 may have been from the context of Level VI, but given the evidence of the thorough cleaning and remodeling effort in the construction of Feature 9, it is presumed that the radiocarbon sample was ground into the floor from the occupation of Feature 9.

Level VII

Level VII contained at least four cultural features. Features 3, 5, 8 and 16 appear to be subfeatures of Feature 9, the habitation (see Figures 7 and 12). Stratigraphically, Feature 8 was above the floor near the B/2 lines intersection. It is possible that this feature could have been a raised hearth (oven), because during excavation, stones from the floor of Feature 9 were removed as part of Feature 8 (see Figure 10). Since the edges of the floor of Feature 9 curved upward, Feature 8 appears to have been a fire hearth in the floor/wall transition. Feature 10 may have been a small storage cist.

Figure 12.

West-facing view of Feature 9, the habitation. The central depression in the habitation is evident from the slope of the floor slabs. Note the vertical character of the foot of the west wall. The rubble on the south side beneath the chaining pin is presumed to be wall fall. Vertical distance from the floor to the ceiling of the shelter varies from 1.3 to 1.5 meters.

Feature 9 is believed to be Occupation 4. The composite charcoal sample retrieved from the floor indicates a Late Archaic period occupation. One important consideration in understanding this feature is that, given its size and evidence that it was not abandoned catastrophically, the habitation was used and cleaned repeatedly. Evidence of this is the relative absence of faunal material and the difficulty in determining functional areas within the feature. This determination contrasts with data from Anasazi pithouses, where vast amounts of cultural debris were left as a result of rapid abandonment. Functional area interpretations are best identified in catastrophically abandoned features, and in the case of Feature 9, there is only some evidence of functionally defined areas.

The construction of Feature 9 indicates that the shape and dimensions of the habitation were planned and that the habitation was built as a single unit, as opposed to growing by accretion. The truncated character of Levels V and VI, and the fact that the rear sections of the habitation were in contact with the sterile parent deposits of the rockshelter support this contention. Furthermore, the slabs that composed the floor fall within a regular size range. Forty cm was the maximum diameter and the thickness ranged from two to five centimeters. While there was no discernible paving plan for the floor, the rock was laid as pavement with no more than 5 cm gap between the stones. The relative angularity of the edges and the flatness of the surfaces seem to have been a deciding factor for the selection of the sandstone for the pavers. The stones were collected apparently from the sandstone formations in the area. There was a distinct absence of river cobbles as paving material.

The deposits wedged between and immediately above the slabs are considered to be in context with the habitation. There were no intrusive pits that disturbed the flooring or the deposits in floor context. The amount of cultural material retrieved from floor context was small, given the fact that the edges of the structure curved up in saucer-shaped fashion. There was some indication that a midden did exist outside the rockshelter (see Figure 7). Those deposits were in very mixed context.

It is not possible to determine when Feature 9 ceased to function as a roofed habitation. Even after deposits had built up on the floor to a depth of 20-30 cm, those deposits would have been flat enough to have provided a sizable occupation area within the shelter. Thus, the date from the contact

of Levels VII-VIII is not construed to be abandonment of the feature, but is the first definable occupation after abandonment of Feature 9. This represents approximately 300 years.

The single radiocarbon date from Level VII is charcoal from the floor of Feature 9 and the date, 2410 ± 70 B.P. (DIC-1660), indicates that this habitation is terminal Archaic period in age.

Feature 6 appears to have been a firepit excavated into the fill of Feature 9 subsequent to the abandonment of the habitation. It appears to have been only a temporary occupation of the site.

Level VIII

Level VIII contained seven features, six of which were hearths. It is the first depositional level that is included in all three areas of the site (see Figure 5). Features from all three areas produced radiocarbon dates which allowed useful correlative data. The oldest feature in the level, Feature 28, was a basin hearth with a cluster of stones and was excavated into Level VII. It was placed outside the dripline in front of the shelter, as opposed to being in it.

Feature 4 appears to have been an ash pit. It was first exposed by Test Trench 7. A charcoal sample from the Feature 7 hearth was dated at 1210 ± 50 B.P. (DIC-1663). Feature 4 was located just over one meter horizontally from Feature 7, and the two features occur at the same level. It appears that although Feature 4 was cut into the underlying level and Feature 7 was located in the middle of Level VIII, the two were related and that Feature 4 served as a pit for the ash from Feature 7. Level VIII in the vicinity of Feature 7 is not very thick and Feature 7 is less than 10 cm from the base of the level.

Feature 30, a surface hearth in Area B, was also located at the bottom of Level VIII and with a radiocarbon date of 2050 ± 65 B.P. (DIC-1661), provides proof that the contact zones between Levels VI and VII occurred in the 2000-2100 B.P. year range (see Pedologic Stratigraphy, this volume). Radiocarbon dates from general level samples and features indicate deposition over a 1500-year period.

Feature 15, a surface hearth, was also located in Area B. It is interesting to note that hearth construction in Area B was different than in Areas A or C for the general time period.

In Area A, Feature 31 is the only feature in Level VIII. With a date of 1010 ± 55 B.P. (DIC-1662), this basin hearth is approximately in the middle of this stratigraphic level. Coincidentally, Feature 7 in Area C, with a radiocarbon date of 1210 ± 50 B.P. (DIC-1663), is also a basin hearth and is located in the middle of Level VIII. The contemporaneity of these two features is very certain.

Feature 1 in Area C is slab-lined basin hearth and is the uppermost feature in Level VIII. It is located behind the dripline near the back wall and was apparently contemporaneous with Feature 2, although it was not as functional because of its location. The stratigraphic distinctions between Levels VIII, IX and X are of secondary consideration because of the differential weathering and deposition pattern at Area C.

Level VIII contains evidence of occupations 5, 6 and 7. It is most like Level IV in this, as well as other, respects. In terms of occupation associations, it is important to note that the Feature 28 date, 2100 ± 55 B.P. (DIC-1798), is at the base of Level VIII and constitutes the first occupation subsequent to Feature 9. This argument is borne out by the analagous dates in Areas A and B of 2050 ± 65 B.P. (DIC-1661) and 1850 ± 95 B.P. (DIC-1805), respectively. This portion of Level VIII, as an occupation, is established firmly because of the dates from Areas A and B. Occupation 6 is also established firmly because the 1210 ± 50 B.P. (DIC-1663) and 1010 ± 55 B.P. (DIC-1662) dates from Areas C and A, respectively, are also from features. The last occupation of the site encompasses Levels VIII-X. This occupation is also dated reliably in Area C as Feature 1. Here again, the occupation includes Area A in Level X.

Level X

Feature 32, a hearth, is the uppermost feature in Area A. It was in Level X and was excavated into a portion of Level IX. It is presumed that Features 32, 1 and 2 were contemporaneous, and with the radiocarbon date of 520 ± 55 B.P. (DIC-1657), represent the last prehistoric occupation at 5GF110.

Feature Summary

In summation, a brief review of the sequence of features will clarify the relationships of the features one to another and to the occupations. It

is most useful to refer back to Figures 7, 8 and 9 for a clear understanding of these feature relationships.

Features 19 and 17 are intrusive into Level I, the bedrock. Feature 23 sits on Level I. Consequently, these three features should be viewed as contemporaneous, and probably represent the first occupation. Features 22, 24 and 25 are the tripod and since they are intrusive into Features 19 and 23, they are considered to be later than those features and comprise the second occupation. The stratigraphic placement of Features 12, 21 and 29 in the profiles indicates they are contemporaneous and represent the third occupation. Feature 27 is situated well above Feature 29 and is outside the shelter; consequently, its correlation with other features is impossible to determine satisfactorily. Feature 9, the habitation, includes Features 3, 5, 8 and 16 as subfeatures and constitutes the fourth occupation. Feature 6 is another feature that cannot be associated satisfactorily with any of the occupations. It may be an additional portion of Feature 5, though it is difficult to determine. Feature 28 represents the fifth occupation. It is at the base of Level VIII and is intrusive into Level VII. It is conceivable that Feature 4 is contemporaneous with Feature 28 in that Feature 4 is at the base of Level VIII and is in an entirely different location at the site. Feature 28 is well outside the dripline; Feature 4 is well behind the dripline. This would suggest use of the greater part of the rockshelter. Feature 7 represents the sixth occupation and is situated in the middle of Level VIII. It is behind the dripline and stratigraphically above Feature 4. Features 1 and 2 represent the seventh occupation. They occupy a different area behind the dripline and are stratigraphically above Feature 7.

MATERIAL CULTURE

John Gooding

The artifacts retrieved from Sisyphus Shelter were over 99 percent lithic remains. The few perishables will be dealt with individually. However, they are proof that an undetermined percentage of artifacts have disintegrated. This must be kept in mind during the course of interpreting the lithic material. It is well known that sheltered sites (dry caves) which yield perishable remains generally yield a higher percentage of those perishables than lithic remains. Consequently, the lithic analysis for any semi-open site, such as Sisyphus Shelter, is necessarily biased and insufficient.

The analytical approach taken in the lithic analysis for this site is standardized in accepted definitions of tool types. Consequently, there will be reference to definitons only when an unusual or rarely used tool type is discussed. The interpretive section of this analysis is, however, oriented toward tool kits (complete tool assemblages). It is obvious that Area C of the site was occupied intermittently for 4000 years. The only tool type that appears to have changed stylistically is the projectile point. Unfortunately, this single tool type is not sufficient to contribute to an understanding of environmental limitations and exploitation patterns of the site's occupants through time. Therefore, the interpretation is based on complete tool assemblages separated by level and, where possible, separated by feature within the levels. The goal here is to gain a better understanding of percentages of tool types used and discarded at the site, which is presumed to be some measure of tool use at the site (see also Appendix III, this volume). This approach is mitigated by factors of floating and sinking of artifactual remains in occupied prehistoric sites. (For a more thorough discussion of site formation processes, see Villa 1982.) Such arguments notwithstanding, a certain amount of credence must be given to the general understanding of geological depositional processes. As a result, within a certain degree of latitude, it can be presumed generally that those artifacts that are lower in the stratigraphic deposits are older and those that are higher in the stratigraphic deposits are relatively younger.

Lithic Material Types

The first important question in the lithic analysis of 5GF110 is that of material type. The site is not a quarry site and illustrates a reliance on imported and incidentally collected materials for tool production. In this report, the lithic materials analysis is limited to Area C, where there was sufficient retrieval to determine changes of preference for tool material types through time. The material section is discussed and concluded separately from the functional analysis of the tools in the interests of clarity and presentation of the stratigraphic data.

Briefly, it does appear that there are materials selected for tool functions and furthermore, there does seem to be some cultural selection for material types.

There are 16 lithic material types (Table 4). The totals that are used to generate the chart make no distinctions about selection processes for tool types, or any statements about preferences resulting from the workability of any particular lithic type. This interpretation of material types is carried only to a rather gross level because debitage analysis, like potsherd analysis, deals in a topic of uncontrolled by-products, and is subject to subsequent actions (e.g., trampling or housekeeping) that bias the sample. With this in mind, and assuming that the influences are applied generally to the assemblage, the chart does indicate what was used, and to a large extent, what was preferred. The chart is limited specifically to Area C because that area has the greatest stratigraphic separation. As a result, the chart is separated by levels. The purpose of this breakdown is to gain some understanding of material preferences during different occupational periods of the site.

In compiling the raw data, the chalcedonies, cherts, quartzites, metasediments and sandstone were subdivided by color. The color distinctions are not included here because they can be arbitrary and did not seem to be a factor in the selections for workability.

There are no known quarry locations in the vicinity of 5GF110 and none that are well known within the region. The obvious local source of workable stone is the Colorado River, one mile to the south. Since the river is exceptionally large for the region and drains the entire western slope of the Southern Rockies, it is quite possible that all of the materials in this

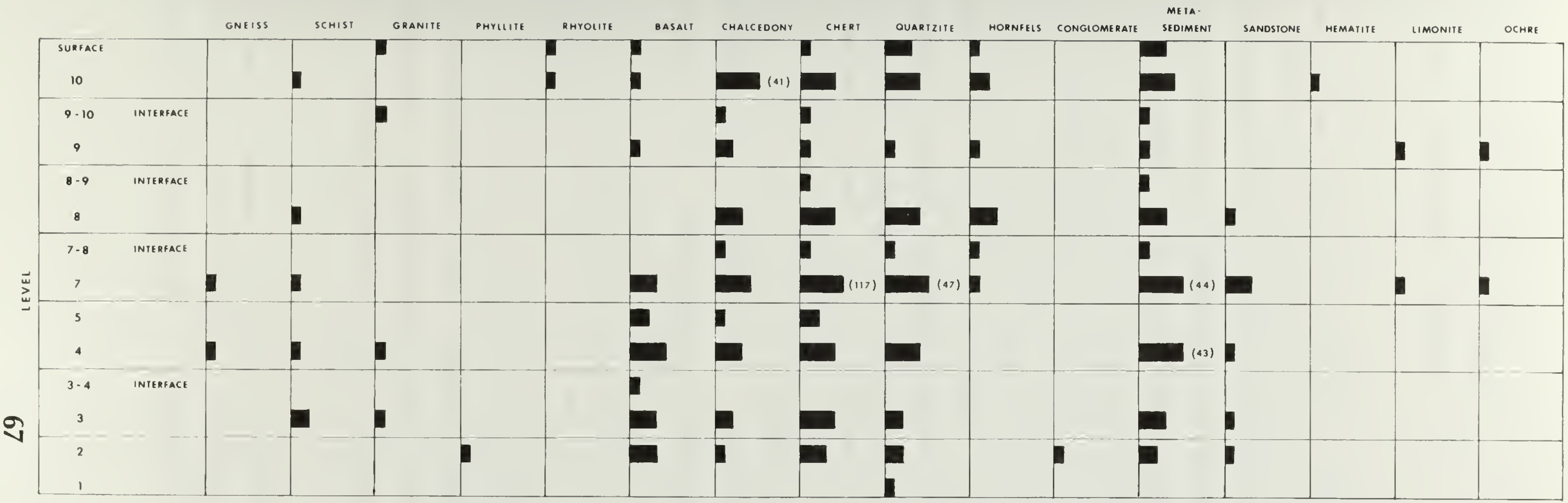
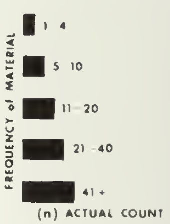


Table 4.
Frequency of material types by level, Area C.



assemblage could have been taken from the riverbed. Because hematite, limonite and ochre are secondary minerals and are soft, their survivability in the riverbed is unlikely. It is presumed that these were mined or collected from their primary source and were probably specific function materials. This is supported also by the very low frequency of these materials in the assemblage. There is no way of proving quarry sources in this circumstance and disallows any presumptions of imported material types.

The most obvious general observation is that chert is the most abundant material type, but only slightly more abundant than quartzite and the metasediment (see Table 4). Chalcedony was less popular, though its percentage representation increased in the later (uppermost) levels. The remaining types appear with lower frequency in most levels and it is felt that they were used for selective reasons, i.e., sandstone for the grinding implements.

The material type counts are broken down by level and interface of levels. There is no attempt to make distinctions between features in the interest of the readability of the table and the fact that the proximity of the features makes feature associations for material types rather arbitrary. The inclusion of the four interfaces is intended to resolve issues of placement of artifacts where it was truly impossible to ascertain with which level they were associated. The interfaces have no implications in cultural or geological stratigraphic interpretation.

Level I

Level I is presumed to be mixing of cultural deposits with sterile fill. With the absence of features it is not surprising that the artifactual remains consist of two quartzite flakes. The placement of these quartzite flakes in the lowest level could just as easily be the result of mixing of the older deposits. The quartzite is well represented not only in numbers but also in 10 of the 14 levels or interfaces. With that high representation, it would not be unusual to find random flakes in the base layer.

Level II

Level II presents a very different picture in terms of material types and counts. The level is represented by eight material types, the most abundant of which were chert and basalt. It is assumed here that Level II

is the first occupational level at the site, based on the evidence of the groundstone artifacts which, because of their size, are less prone to vertical and horizontal movement. Phyllite and conglomerate are represented only in this level.

Level III

Level III contains eight material types; again, the most abundant is chert, which demonstrates a percentage increase in the overall type assemblage over Level II. The percentage of basalt is somewhat lower and the representation of the metasediment increases. The granite specimen from Level III is unusual in that it does not reoccur, with the exception of one specimen from Level IV, until the very highest levels.

Level III-IV Interface

The Level III-IV interface is a circumstance in which one basalt flake was recovered and could be attributed to neither Level III nor Level IV.

Level IV

Level IV contains a large increase in total numbers of flakes, represented most heavily by metasediments. This is interpreted as a shift in the preference for a primary material type through the increased use of metasediment rather than the lessening of other types, such as basalt and quartzite. It is interesting to point out that this is the first large representation of quartzite in the levels and the fine-grained cryptocrystallines (i.e., chert and chalcedony) were less heavily used. Level IV is the first level in which features were recorded and it follows naturally that there would be a larger number of flakes in the level.

Levels V and VI

Levels V and VI do not contain any features and that absence is borne out by the very low number of flakes, represented by only three types. Levels V and VI are relatively small and discontinuous. As a result, Level V contains only three materials (in very small numbers) and Level VI contains no cultural debris at all. It is apparent that these levels were largely destroyed during the construction of Feature 9.

Level VII

Level VII contains the most cultural debris, most in the context of Feature 9. The most abundant material is chert, with 117 specimens, followed by quartzite and metasediment, with 47 and 44 specimens

respectively. This level has the heaviest representation of sandstone, with 19 specimens. It is also important to note that this level contains one limonite and one ochre specimen.

Level VII-VIII Interface

The Level VII-VIII interface is characterized by small representations of the most abundant material types.

Level VIII

The range of materials and the relative abundance of materials from Level VIII is more analagous to Level IV than to either of its adjoining levels. The implication here is that after the abandonment of the features of Level VII, the occupation pattern of the rockshelter reverted from one of a long-term single occupation back to one of occasional, short-term use.

Level VIII-IX Interface

The Level VIII-IX interface is represented by only two material types in very small quantities. This interface is more likely to have material that has migrated up from Level VIII.

Level IX

Level IX is represented by a broad range of specimens, but all in relatively small numbers. Presumably this implies only expedient and incidental use of the site during the formation of this level.

Level IX-X Interface

The Level IX-X interface yielded four material types in extremely small quantities. Given the percentage representations, the material at this interface is more likely to have come up from Level IX.

Level X

Level X is the first level that has distinctly different percentages in materials. For example, there are high percentages of chalcedony and quartzite. The first occurrence of rhyolite is in this level, which also contains the only two specimens of hematite.

Surface

The surface of Area C is sloping and its exposure to the elements is sufficient that there is little possibility of determining the significance of relationships of materials. It may be important to note that the only other rhyolite flake from the area occurs on the surface, which has close stratigraphic proximity to Level X.

The most abundant material, chert, is evident in most of the levels (12 of a possible 14 levels, including the surface). The greatest representation of chert is in Level VII, related principally to Features 8 and 9. The second most widespread material is metasediment, identified in 11 levels, the predominance of which is the general collections from Levels IV and VII. However, there is also good representation in Level X. This would suggest that metasediment was used consistently throughout the occupations of the area. The occurrence of chalcedony is an interesting phenomenon as a represented material in that its abundance is not particularly great as a percentage of the materials, but its occurrence was very regular (10 levels), and there was a preference for it in Level X. The occurrence of basalt is also one in which there is not a great abundance of material, but it is represented in nine levels and its utilization drops off radically after Level VII. The occurrence of the remaining lithic materials drops significantly with the remaining types. Schist, hornfels and sandstone occur in five levels with no relationship between their occurrence. It is noteworthy that hornfels does not occur until Level VII, with greatest abundance in Level VIII. Granite occurs in only four levels with small quantities in Levels III and IV, and then slightly more abundantly toward the surface. The secondary minerals (limonite, ochre and hematite) should be considered rare, limonite and ochre occurring in two levels and hematite in only one level. The other lithic types (conglomerate, rhyolite, gneiss and phyllite) should be considered incidental, occurring in only one level and in extremely small numbers. Other elements that are extremely rare and not located in Area C are metamorphosed mudstone and diorite.

It became apparent during the excavation of the shelter that the tool assemblage represented did have some distinctive characteristics with regard to tool and material types. They are best illustrated in Table 5. For the purposes of explanation, this table is limited to those tools that are cutting implements.

First, it is important to note that all of the projectile points are either chert or chalcedony, with the exception of two quartzite specimens. None of the other materials are represented in this tool type. Second, it is noteworthy that there are very few biface knives, and they are either chert or chalcedony. As a corollary, it is noteworthy that there were no

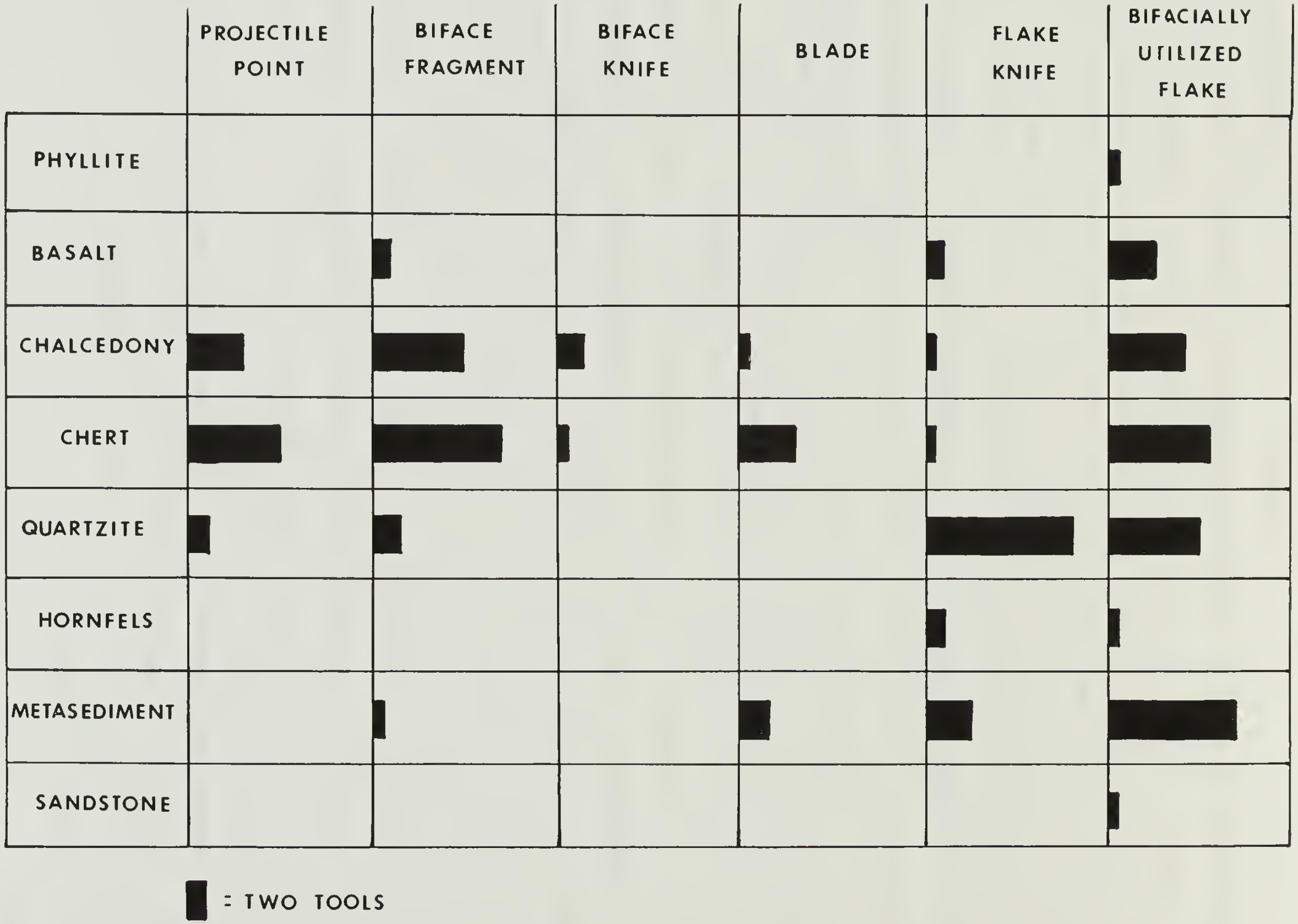


Table 5.
Material type/cutting tool correlation chart.

preforms identified at the site. Third, it is important to note that in contrast to the low number of biface knives, there was a very large number of biface fragments, which were predominantly chert and chalcedony, with only a few of quartzite, basalt and metasediment. Obviously, there was material selection for functional tool types. This is most evident in the projectile point counts. There could be several reasons why there were few bifacial knives, the overriding one being that they were early stages of projectile point manufacture, and as such, evolved into the projectile point category at some later time. This may be supported by the large number of biface fragments in the material type correlation table.

Tool Types

The lithic remains are broken down into seven general categories (Table 6) and subdivided into tool types within those categories. The total number of cutting tools is 131 specimens, including 23 projectile points, 37 knives, 13 multi-functional tools, 20 blades, 3 backed blades, 2 drills and 33 biface fragments. The knives were variable in their finishing. It is important to consider that biface fragments could be parts of either knives or projectile points and the high number of biface fragments would change either of those tool types by significant percentages. The multi-functional tools are considered to be formalized tools that have secondary functions, in some cases with prepared edges and/or surfaces. Their relatively small number suggests, perhaps, that the secondary functions were convenient or expedient, with the exception of four specimens in Level III. The blades are thought to be more indicative of lithic use at the site. The drills are rare formalized tools, and on a percentage basis, are not well represented.

Scraping tools (31 specimens) include 4 general scrapers where most of the edges were utilized, 9 end scrapers, 10 side scrapers, 6 notches and 2 pulping tools which possess end scraper facets, where the wear appears to be the result of a pushing motion.

Incising tools are represented by 1 raclette, 3 beaks, 7 gravers, 9 spurs and 2 burins. It is important to note that these tools are represented generally by small numbers; specific relationships will be dealt with in the assemblage discussion. (For definitions of the raclettes, notches, beaks, gravers, spurs and burins, see Bordes 1968; Irwin and Wormington 1970; Gooding 1981).

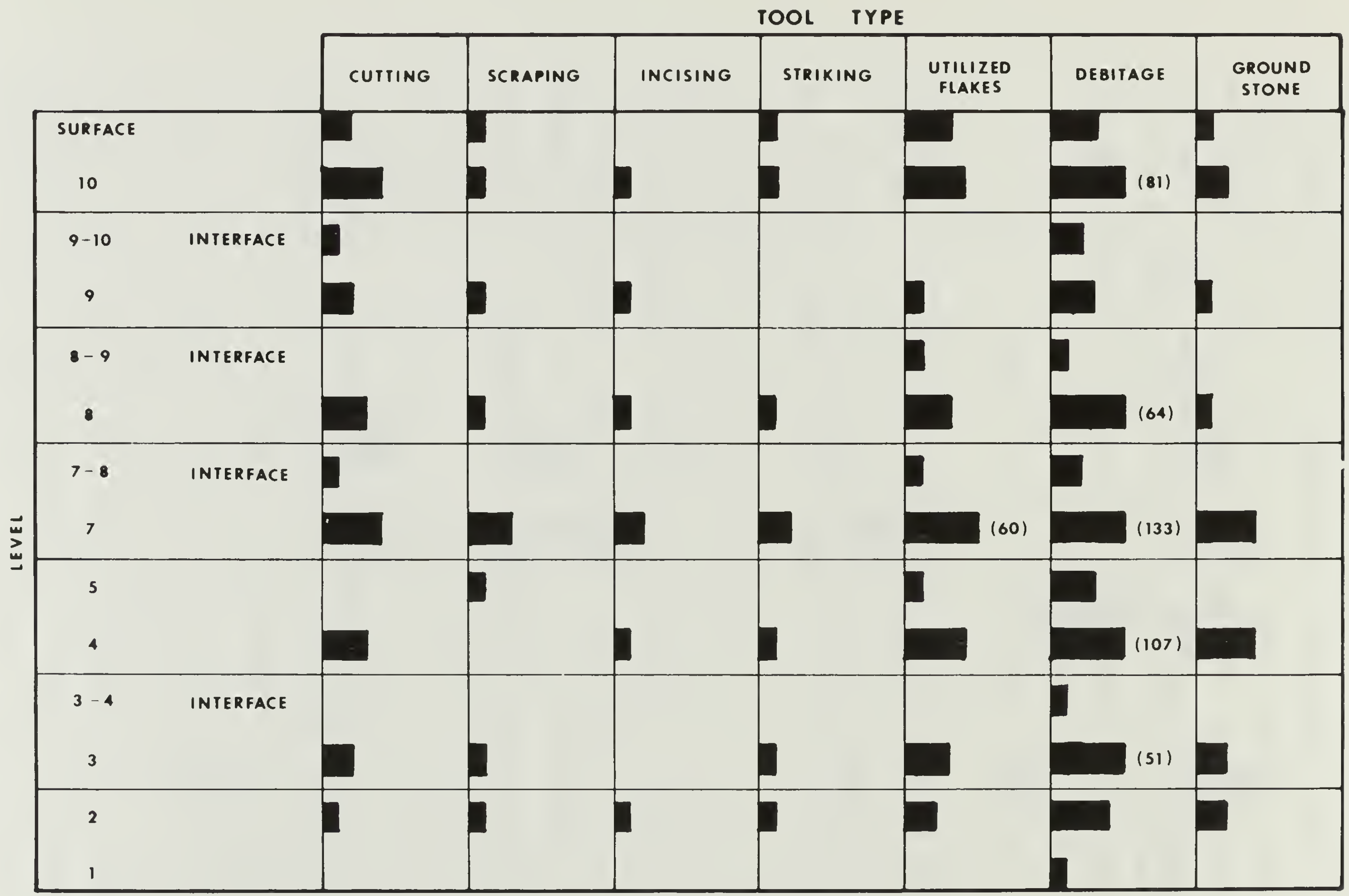
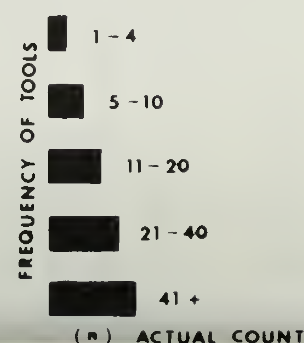


Table 6.
Frequency of tool types by level, Area C.



The general category of striking tools is comprised of 17 choppers, 5 core tools and 5 hammerstones. Presumably, the choppers are gross butchering and food processing tools. The highest abundance of these is in Level VII. The utilized cores appear to be incidental in the assemblages and are expedient tools, displaying mostly scraping and cutting facets. The hammerstones are limited to the upper levels of Area C and may indicate an increase of tool manufacturing at the site in later periods.

Utilized flakes are categorized into 13 types based primarily on flake type and secondarily on utilization. There are 192 specimens, the overriding abundance of which are from Area C, which suggests strongly that lithic use is based on a flake technology.

Table 6 suggests that the greatest frequencies are in the debitage; while this is expected, it should be noted that the ratio of prepared tools to debitage is 1:3. This ratio is higher than at Vail Pass, which was 1:30 (Gooding 1981), and considerably higher than that identified in the sample from the Zephyr Site, which was 1:160 (Indeck and Kihm n.d.). The value of these ratio comparisons is that Indeck and Kihm (n.d.) suggest that Zephyr is a tool production locality and Gooding (1981) suggests that Vail Pass was a hunting camp where lithic production was limited to tool maintenance. The fact that this ratio from Sisyphus Shelter is far higher is evidence of what is considered here to be a flake tool industry, discussed below.

It was possible to identify certain tool types under magnification, such as notches, beaks, gravers, spurs and burins. However, the fact that they were identified under magnification and not macroscopically suggests that they were the result of incidental use of fortuitous shapes or features of the flake and were not resharpened for continued use. Such expedient tool use is defined as belonging more properly to the category of utilized flakes and not to those categories that are defined as formal tools.

The tool type "multi-functional tool" is an unfortunate distinction because it is possible on a given specimen to add any number of functional tool elements. The term "multi-functional" does not distinguish any of the elements and, indeed, can make no distinction between general categories such as cutting, scraping, striking or even grinding. Indeed, the only value of this type distinction is one of keeping numbers straight where one

implement could fit logically into two, three or more tool types. Simply put, the term "multi-functional tool" is, in fact, not a tool type, but an accounting device.

The tools defined as knives incorporate many varieties of cutting tools. The largest distinction that can be made is that between the bifacially reduced core that is triangular in shape and shows obvious cutting wear along one lateral edge (see Figure 26d and e), as opposed to the flake tool that shows only incidental bifacial retouch along one edge with no other modification (see Figure 28b and c).

The relative abundance of these flake knives is curious and is presumed to be associated with some particular type of butchering pattern or faunal exploitation system. Comparison of the abundance of flake knives at 5GF110 to those of other sites at higher elevations, for example, at Vail Pass Camp and the Zephyr Site, illustrates that there is a less well-defined formal tool assemblage and more of a reliance on expedient tools. The high percentage of flake knives that are of quartzite and green metasediment make the material types in this case a relevant factor. Green metasediment was also a high percentage material type at the Kewclaw site, 5GF126. Non-cryptocrystalline material such as green metasediment is considered locally to be a predominant characteristic of Archaic occupation (Carl Conner, personal communication, 1983). The material type/artifact correlation chart (Table 5) indicates that the bifacially reduced tools are primarily cryptocrystalline in their representation, whereas the non-cryptocrystalline, such as quartzite, basalt and metasediment, generally comprise the flake tools.

It is important to distinguish between formal morphological tool types and what is simply a utilized flake. In this case, the flake knives could be placed into the category of utilized flakes. However, their abundance and size suggest strongly that they were probably a recognized variety of tool. The flake knife, though it has few standard components beyond cutting wear on one or more lateral edge, is very reminiscent and is thought here to be analagous to the tool defined by Wormington and Lister (1956:18-20) as the Uncompahgre scraper. This tool has been recognized in other collections in western Colorado (Toll 1977; Gooding 1981). The Uncompahgre scraper is defined as a large flake tool that is generally triangular in shape and possesses a cutting edge, a scraping edge and a chopping edge, and displays

retouch on the chopping edge which is generally bifacial in nature. Obviously, the Uncompahgre scraper is a multi-functional tool that possesses most of the elements of a large butchering tool (see Frison 1978).

It is important to note here that there is no presence/absence correlation or any inverse relationship between flake knives and other bifacial (cutting) tools. Biface fragments occur in levels along with flake knives in various percentage relationships. The inference here is that the flake knife does not replace the biface knife as a cutting implement, and presumably it is a functionally specific tool in its own right.

There is one Uncompahgre scraper at Sisyphus Shelter. This flake knife seems to suggest the same approach to lithic technology as implied by the archaeology of the northern Colorado Plateau.

The heavy reliance on a flake tool industry over a long period of time from at least the Middle Archaic period until the end of the Fremont occupation that can be distinguished from other fundamental approaches to the lithic assemblage, such as the biface industry at the Zephyr Site (Indeck and Kihm n.d.), may be a more useful approach to distinguishing cultural differences between the montane and the Colorado Plateau culture areas. It is difficult at this point to infer much more than to say that open encampments are represented more by formal tool types, whereas the shelters and habitations possess a greater number of utilized flakes. This could be a factor of the duration of occupation; however, if volume of tool remains is any indication of occupancy duration, this is not the case.

Following utilized flakes in percentage of abundance are the cutting tools, which include biface fragments; this inclusion could misrepresent the percentages somewhat. On the other hand, those tools that are identified as projectile points could also have been used secondarily as knives. The tool type "multi-functional tool" is included in this category because in most cases, one of the functions of this tool is a cutting edge.

In general, the assemblages by level do not change qualitatively between the various occupations, and the quantitative changes appear to be selective. In other words, the relative percentages of utilized flakes and cutting tools is the same in Level II as it is in Level VII. It is obvious that Levels IV, VII, VIII and X were the most heavily occupied levels at the site.

Artifact Summary by Level

Level II

Level II is the deepest pedologic level to contain functionally identifiable artifacts. The cultural occupation of this level is conjectural. It is characterized by only one prepared tool, a biface fragment (Figure 13a). The remainder are strictly utilized materials (Figure 13b-h and Figure 14). The backed blade suggests a high degree of workmanship. It is important to note that the groundstone percentage is established at this level and remains fairly constant throughout (see Table 6 and Figure 15).

The character of the fill and the soil color in this level suggests an occupation of something more than brief duration. There was no hearth retrieved from this level. The fire-cracked tool fragments, however, do suggest the presence of a hearth that may have been disturbed. The relatively high percentage of groundstone compared to the flaked stone tools indicates a great reliance on processing of vegetal remains. The absence of temporally diagnostic tools, such as projectile points, adds to this possibility. Perhaps, it was a small group occupation that was conservative in tool use, or tools lost or discarded by the first occupation may have been salvaged and reused by the numerous subsequent occupations.

The highest frequency of tool types in this assemblage are the gravers (Figure 14b-e). Presumably, these are indicative of leather, wood or bone work (see Frison and Bradley 1980). The polish on a utilized flake (Figure 14g) supports that possibility.

Level III

Level III is also a conjectural occupation. It contains a greater diversity of flaked tool utilization, the first appearance of the flake knife (Figure 16a) and a tool which qualifies as an Uncompahgre scraper (Figure 16b). There is also evidence of biface technology (Figures 17b, 18a and b) but still, there seems to be a primary reliance on tools that are modified flakes (Figure 17a, c-f; 18c-d). There are two groundstone specimens, one of which is fire cracked (Figure 19). Groundstone percentage is consistent with Level II.

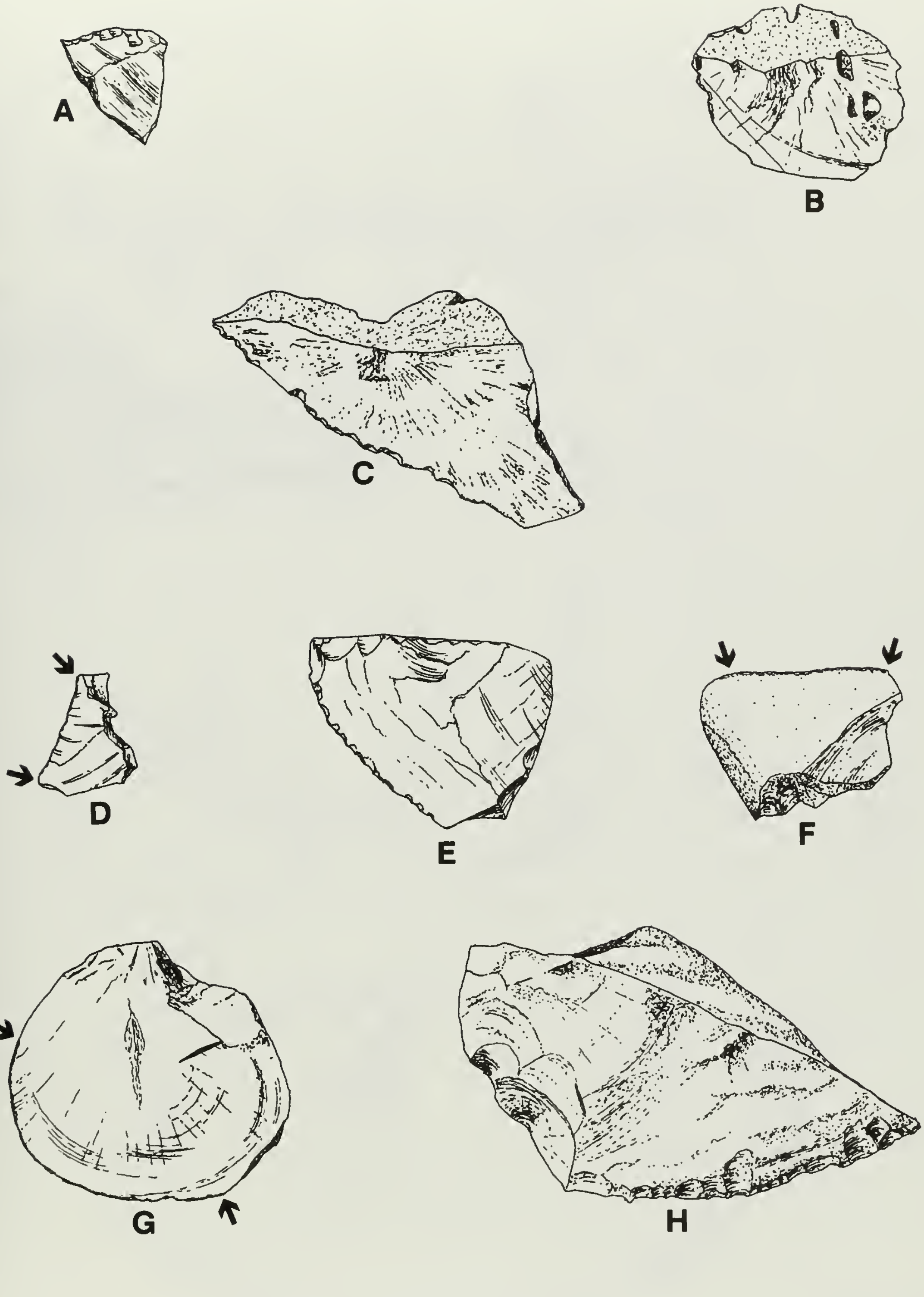


Figure 13.

Artifacts from general Level II.
A: Biface fragment. B-C: Bifacially utilized secondary decortication flakes. D-H: Unifacially utilized flakes. Wear is indicated between arrows where not immediately evident. All artifacts are to scale.

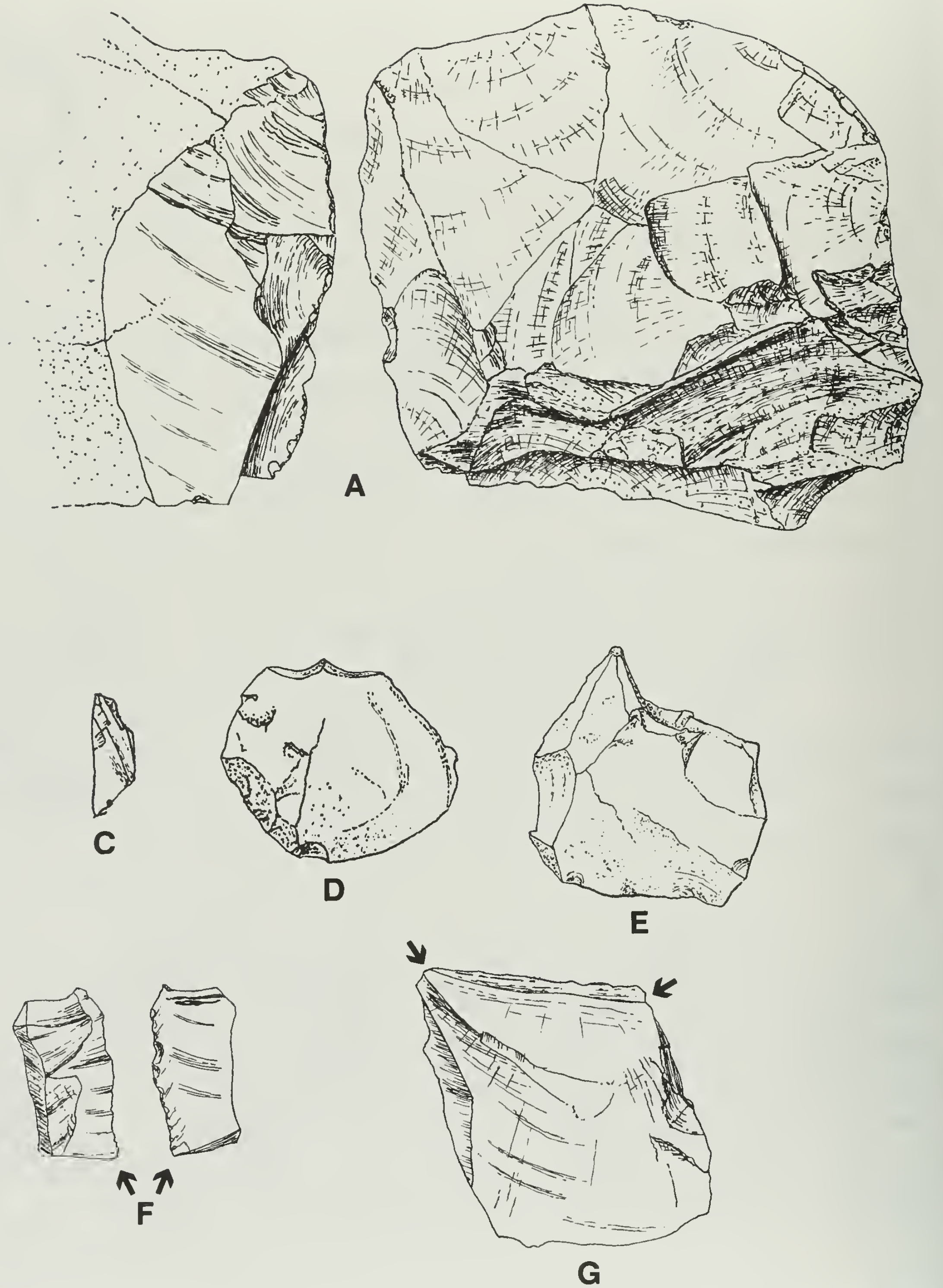


Figure 14.

Additional artifacts from general Level II.
A: Chopper. Illustration shows wear on reverse surface. B-D: Gravers. E: Utilized graver facet. F: Backed blade. Illustration of reverse side shows attrition on worked edge (arrows indicate worked edge). G: Utilized flake with no retouch. The near surface edge (arrows) has very high polish with transverse wear striations evident in the polish (seen under 15X magnification); possibly a leather burnishing tool. All artifacts are to scale.

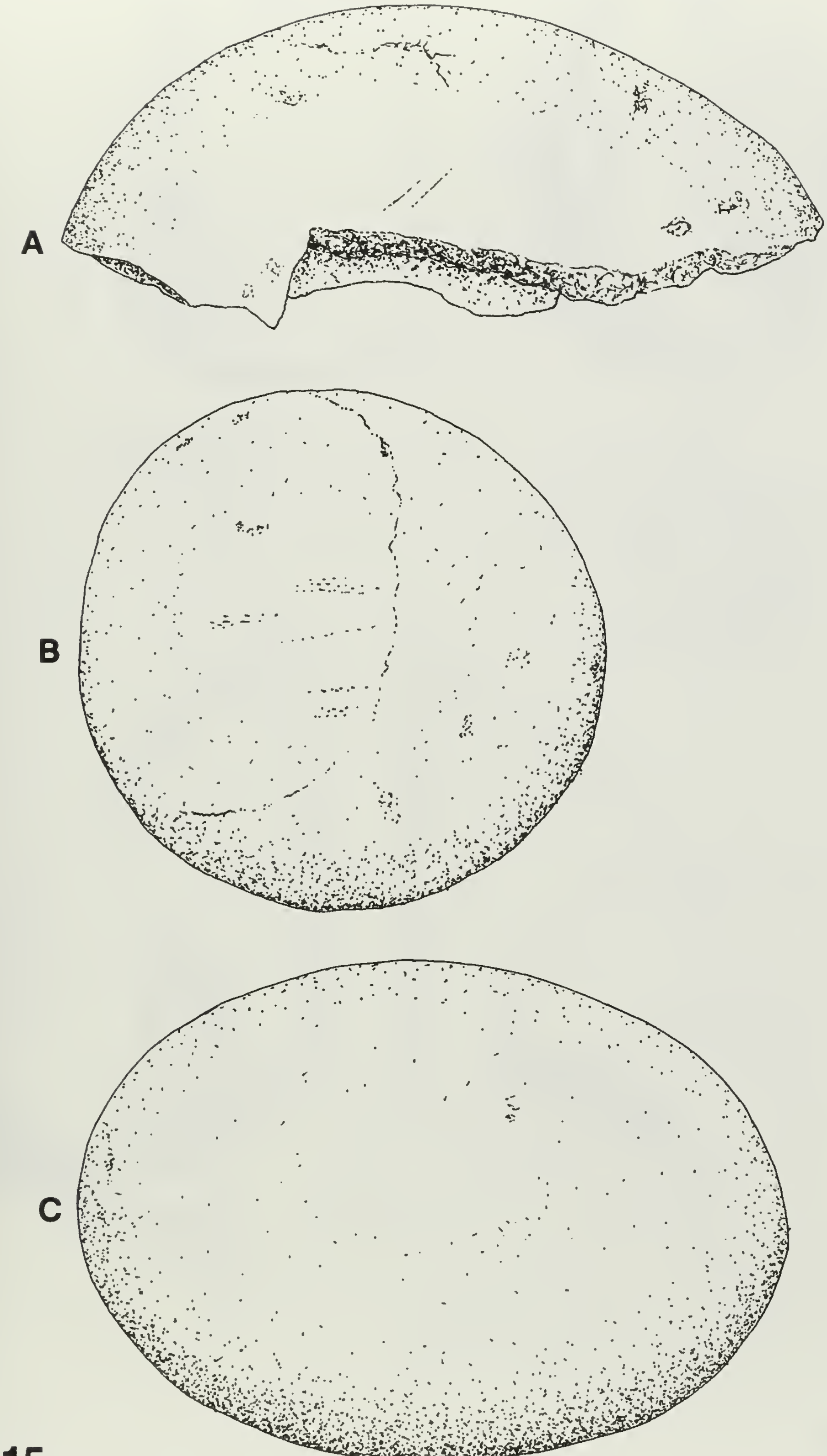


Figure 15.

A-C: Three of the five manos from Level II.
Specimen A is fire-cracked. Worked surface is evident on specimen B. Artifacts are to scale.

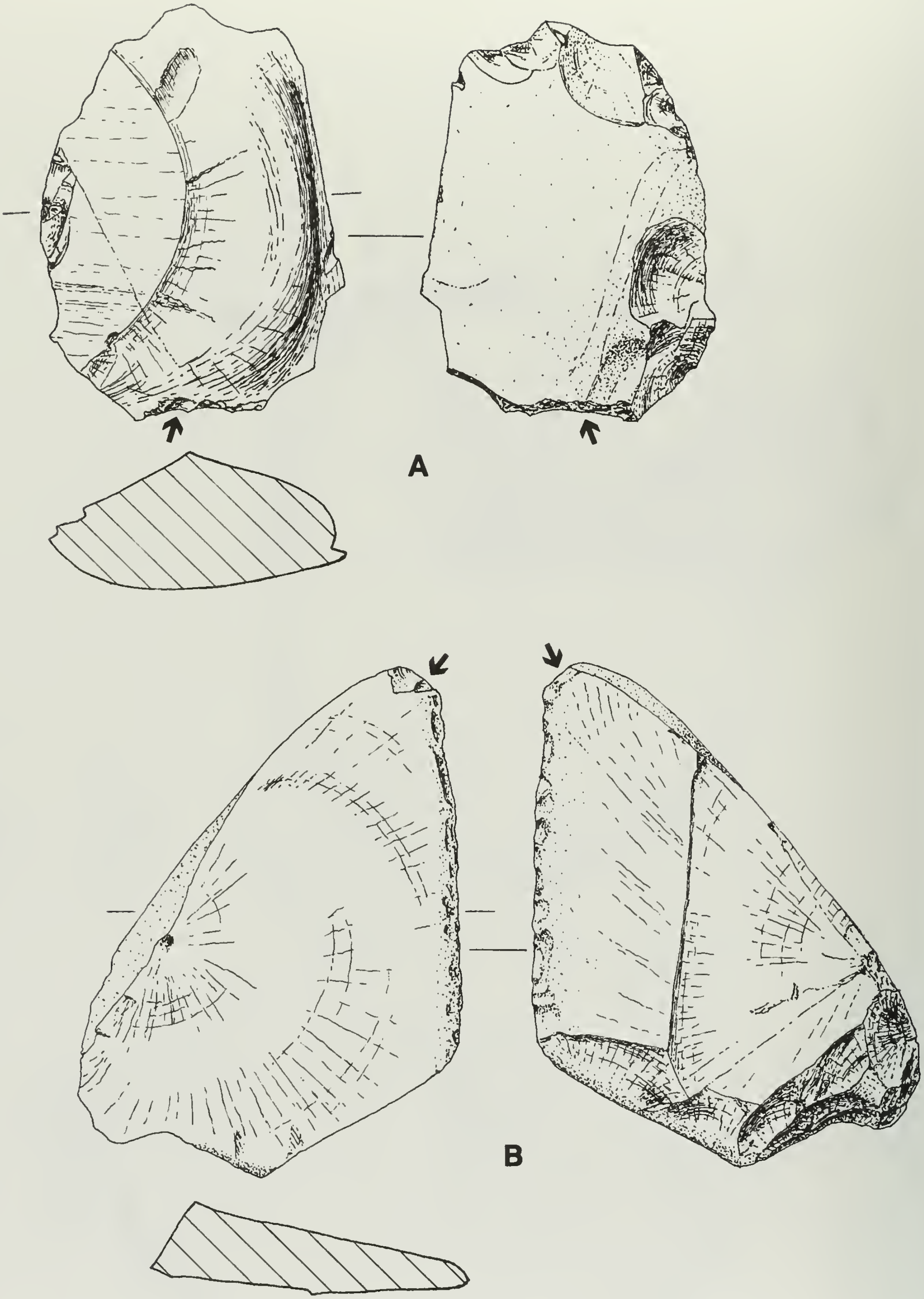


Figure 16.

Specimens A and B are modified flake tools from Level III.
Arrows on specimen A indicate chopping facet. The bulbous distal end has a hinge fracture with scraper wear. Specimen B is an Uncompahgre scraper. Arrows indicate incising wear. Artifacts are to scale.

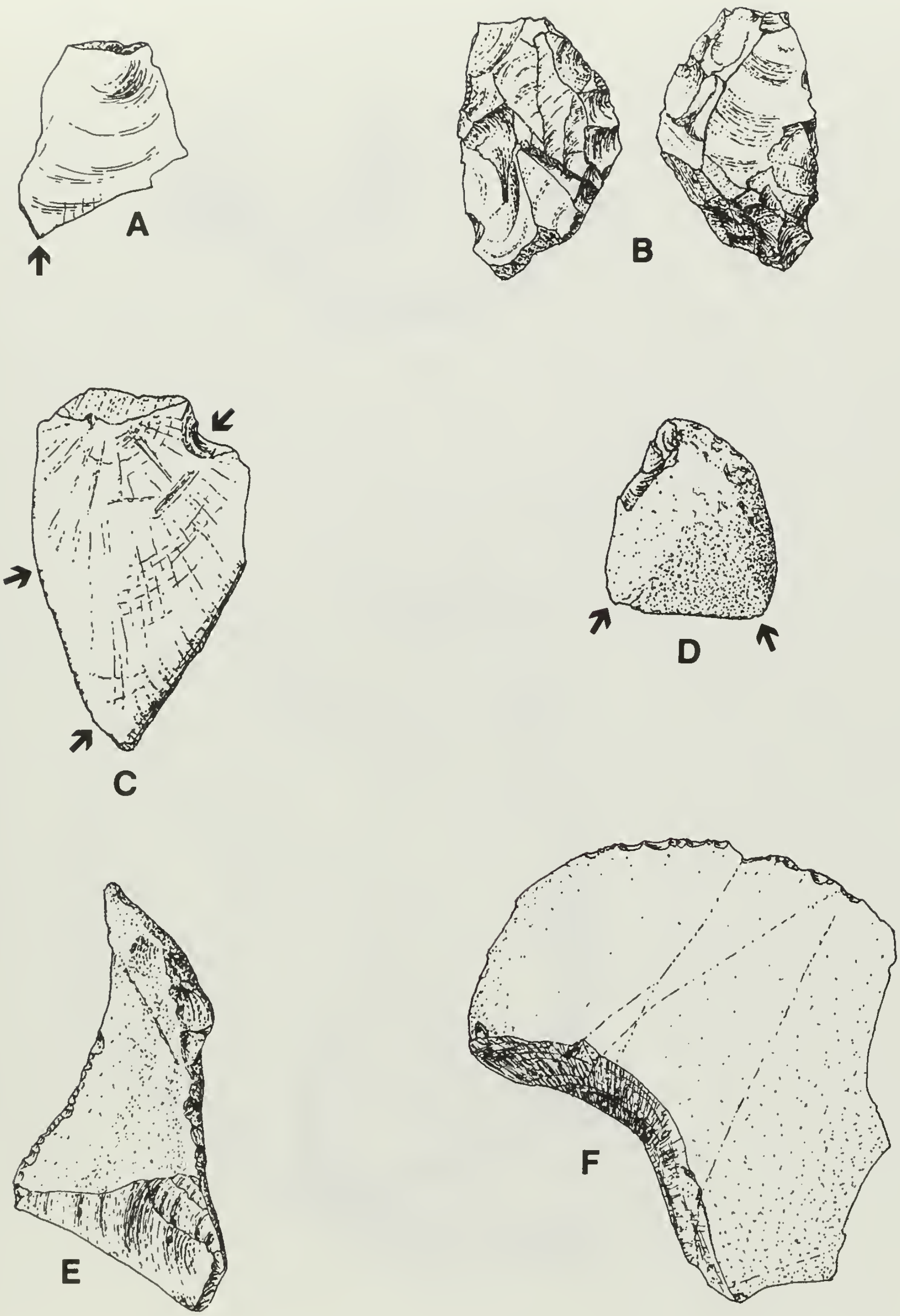


Figure 17.

Additional flake tools from Level III.
A: Bifacial thinning flake with scraper and graver wear (arrow). B: Utilized core, bifacially reduced with various types of wear. C: Exhibits scraper wear and a notch (arrows). D: Exhibits scraper wear with a polished surface (arrows). E: Exhibits a cutting edge and incising wear on the projection. F: Unifacially utilized flake. All artifacts are to scale.

Figure 18.

Additional tools from Level III.
A: Trimming flake with a V-shaped notch on distal end (arrow). B: Biface with incising wear on the projection. C-D: Bifacially utilized flakes. All artifacts are to scale.

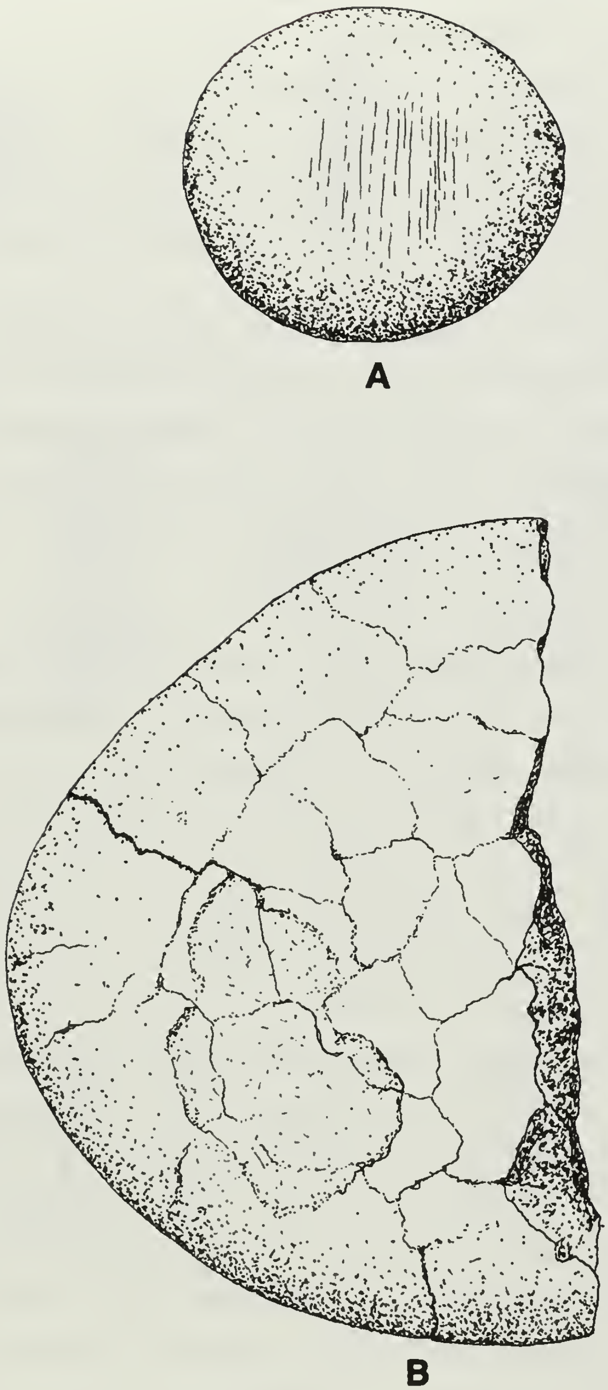


Figure 19.

This figure illustrates the most complete groundstone tools from Level III.
A: Small cobble that exhibits grinding wear. B: Fire-cracked mano. Artifacts are to scale.

The flake tools of this level are of a greater size than those of Level II. The incidence of the Uncompahgre scraper, as well as the other large flake tools may suggest evidence of big game processing. This appears to be the distinction between the assemblages of Levels II and III.

Another difference between the assemblage in this level and in Level II is the addition of notches and larger scraper facets on the utilized flakes and the presence of biface thinning flakes in Level III. Conceivably, the presence of biface thinning flakes, as well as biface fragments, is evidence of production of bifaces at this location.

Therefore, if one were to suggest single brief occupancy for Levels II and III, the artifact assemblages would suggest different functions for the occupants, the possibility being clothing or tool production for Level II and game processing for Level III. It is conceivable that both of these functions are complementary to the vegetal processing indicated by the presence of groundstone.

Level IV

Level IV can be distinguished from Level III in several important aspects of the flaked stone technology. There is a substantial increase in evidence of blades (Figure 20g-h) and bifaces (Figure 20c, 21a-b). While there is no decrease in the number of utilized flakes, there is a radical increase (over 100 percent) in the amount of debitage to the quantity of debitage in Level III. The increased number of groundstone specimens (Figure 21e) may be more a factor of small fragments than complete artifacts.

This level produced the first evidence of projectile points, which are associated with the Pinto series (Figure 20b), Elko Eared types (Figure 20d) and a specimen that cannot be assigned to any typological category (Figure 20a). This level produced a high percentage of formal tool types and a smaller relative percentage of utilized flakes or flake tools (Figure 20e-f, 21d). The percentage of manos and the volume of debitage double over either of the two previous levels. It is important, perhaps, to correlate this with the fact that there were eight features recovered from Level IV. Obviously, Level IV is a definable occupation that spans several hundred years. It is here where the occupation of the shelter can be firmly identified.

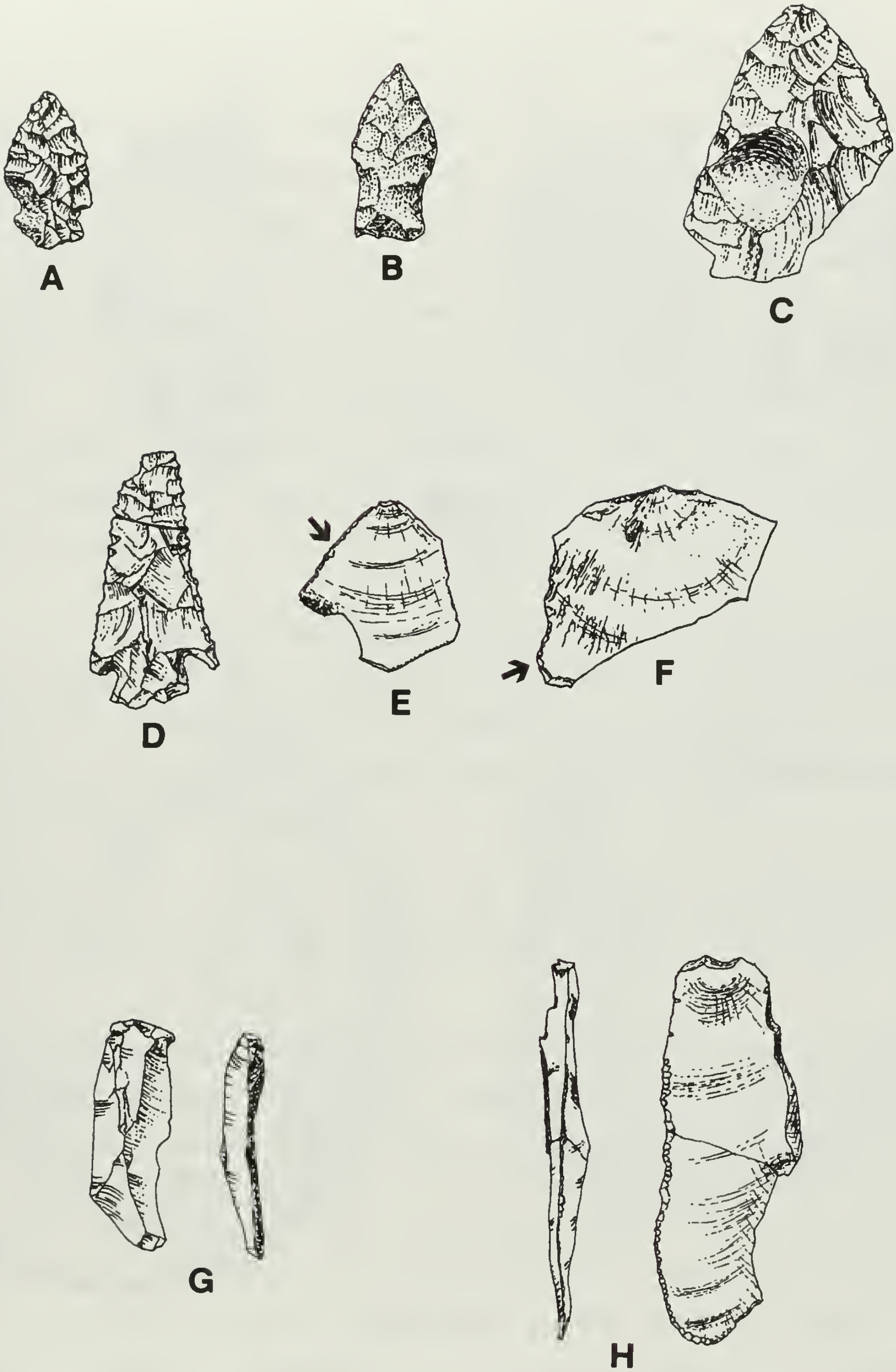


Figure 20.

Artifacts from general Level IV.
A-B: Two heavily resharpened projectile points that have been associated with dates of the Middle Archaic. Specimen A cannot be assigned to any typological category. Specimen B is a Pinto shouldered projectile point. C: Tip of a large biface, presumably a knife. Exhibits extensive wear. D: Elko Eared projectile point. E-F: Unifacially utilized flakes (arrows). G-H: Very good examples of blades that exhibit cutting, scraping and incising wear. Specimen H is conjoined. Artifacts are to scale.

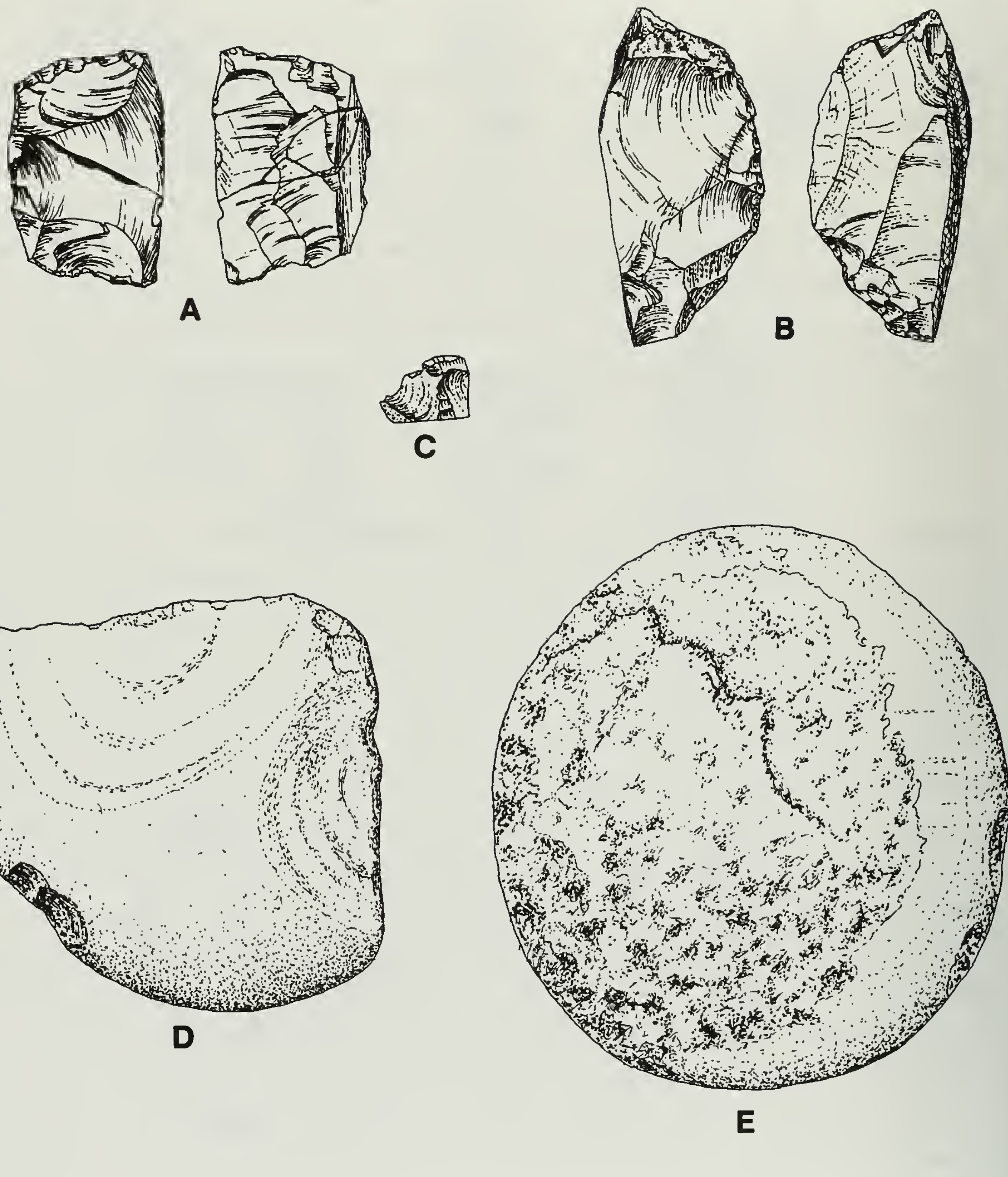


Figure 21.

All artifacts are from Level IV, Feature 29, except specimen C.
A-B: Bifaces. Both exhibit scraper and graver wear. C: Fragment of an end scraper from Level V. D: Large modified flake. E: Mano with heavily pecked surface. Artifacts are to scale.

There is a low number of scraping tools and a comparatively low number of striking tools (3) from this level. Utilized flakes were commonly produced from biface thinning flakes (10), secondary decortication and unifacially utilized flakes (8). Of course, it is possible that the cultural remains recovered from Levels II and III had migrated downward during the occupation of Level IV, but the lower levels did not exhibit evidence of mud cracking, extensive bioturbation or other mechanisms that would contribute to such movement. It is important to remember here that Level III was a discontinuous level that had portions of Level IV both above and below it. Level IV suggests longer duration occupations, as evidenced by the depth of the deposit, the number of hearths and the presence of a broader range of tools in the assemblage. The big game processing activities suggested for Level III are not inconsistent with the tool assemblage from Level IV.

Level V

Level V is an undated occupation that possessed an assemblage of 14 specimens that includes one scraping tool (Figure 21c), one utilized flake and 12 pieces of debitage. This material was not diagnostic in any meaningful way. It is presumed that it was a cultural deposit obliterated during the construction of Feature 9.

Level VI

Level VI is a more extreme case of the remodeling efforts for Feature 9, in that no cultural material was retrieved from it.

Level VII

The level possessed at least three firmly identified features, 8, 9, and 16. As mentioned above, there was extensive remodeling of the Area C rockshelter for the construction of Feature 9. Presumably, these remodeling efforts destroyed some features in Levels V and VI and displaced some artifacts. One advantage in the interpretation of Feature 9 is that it possessed the slab-lined floor (see Figure 12). Within the bounds of the feature, the floor acted as an impenetrable barrier that prevented artifacts from migrating upward or downward in the deposits after its construction. There is a distinction between artifacts of the habitation and artifacts from the general level, such as those from Features 8 and 16. There is sufficient evidence to suggest that those features are sub-features of the

habitation. Therefore, not all artifacts from Level VII are considered to be remnants of the occupation of Feature 9. It is important to point out that the radiocarbon dates suggest that Level VII was time-transgressive, spanning 300 years.

Features 6 and 10, which were also located in Level VII, are high enough above and far enough removed from Feature 9 to be unasssociated with it. Unfortunately, there are no associated artifacts or radiocarbon dates from either of these features. Feature 6 is a floating feature in that it had no contact with the floor level of Feature 9 and is presumed to be a later firepit excavated into the roof fall of the habitation. The association of Feature 10 with the habitation is open to conjecture.

It is important to point out that the great majority of artifactual remains from this level were from the floor context of Feature 9. These remains are considered to be associated more closely with the dates of the construction of that feature than with the dates of the Level VII-VIII contact. The artifact assemblage from the habitation is by far the largest of any feature or level at the site. The assemblage includes spurs (Figure 22a-c), utilized blades (Figure 22d-f), a beak (Figure 22g), a double graver (Figure 22h), a raclette (Figure 22i) and a cache of end scrapers (Figure 22j-n), the latter of which were all made of the same material. The floor assemblage also included hammerstones (Figure 23a and c), a chopper (Figure 23b), manos (Figure 24a and b) and a metate (Figure 25). The metate is possibly a remnant of an earlier occupation because it was incorporated into the floor slabs of the features (see Figure 11). The assemblage also included a notch tool (Figure 26a), projectile points (Figure 26b and c) and biface knives in complete form (Figure 26d and e), as well as flake knives (Figure 26f, h and i) and a spokeshave/end scraper (Figure 26g).

Specimens from other features in association with the habitation are the blade (Figure 27a) from Feature 16 and the side scraper and projectile point (Figure 27b and c) from Feature 8. The blade mentioned above is not temporally diagnostic but is of the same character as other blades from the general level, because it does not have extensive retouch. The blade specimens f-h from Figure 27 all exhibit unifacial wear. Specimen h (Figure 27) possesses a notch. The projectile point shown in Figure 27d is from general Level VII.

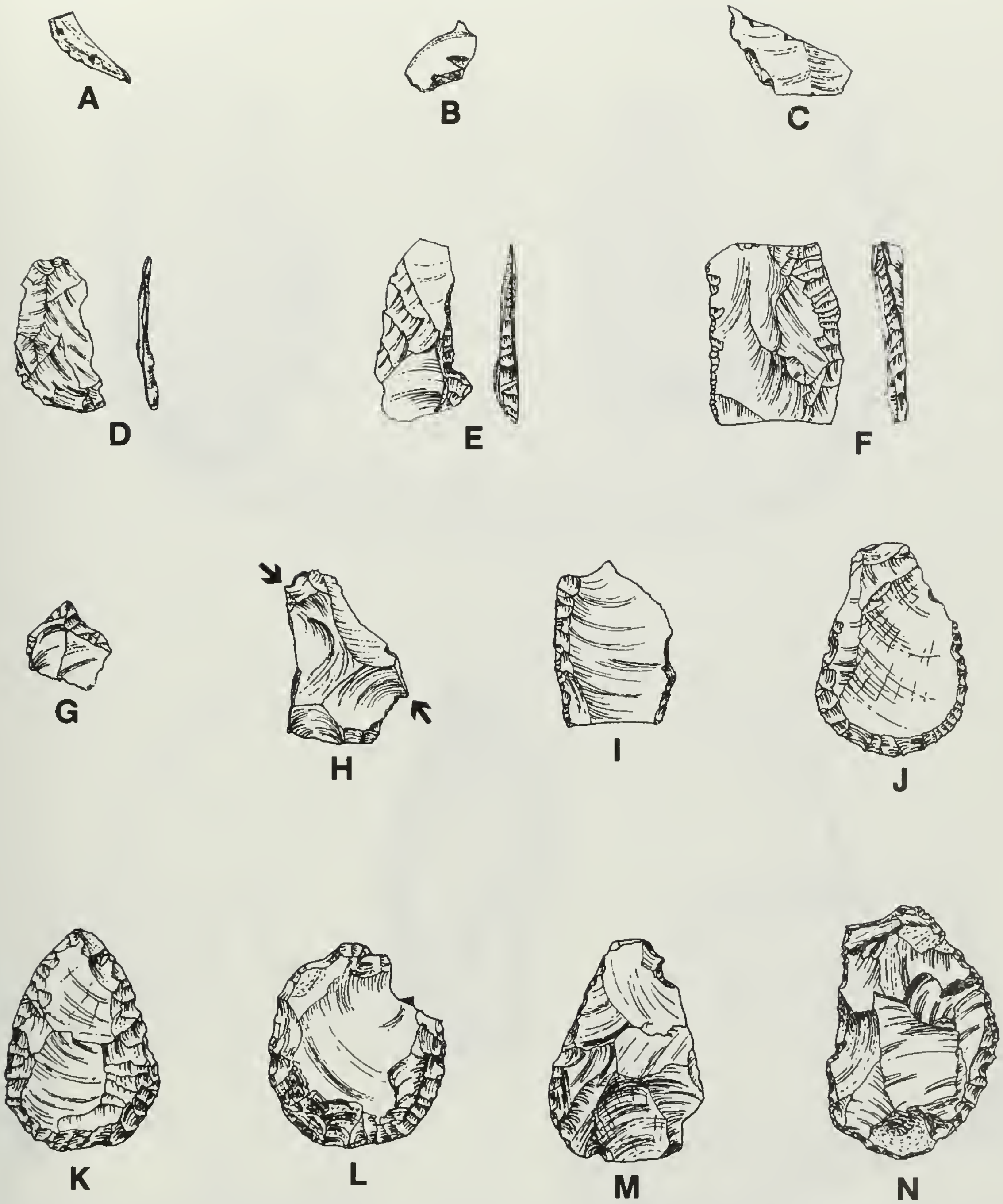


Figure 22.

This illustration is the first of a series of artifacts from the floor of Feature 9, Level VII.
A-C: Spurs. D-F: Blades that exhibit unifacial wear. Specimen F exhibits bifacial wear on one lateral edge.
G: Beak (note broad angle of point). H: Double graver (arrows). I: Classic definition of a raclette. J-N: End scrapers found in close proximity on the floor, all of the same material. All artifacts are to scale.

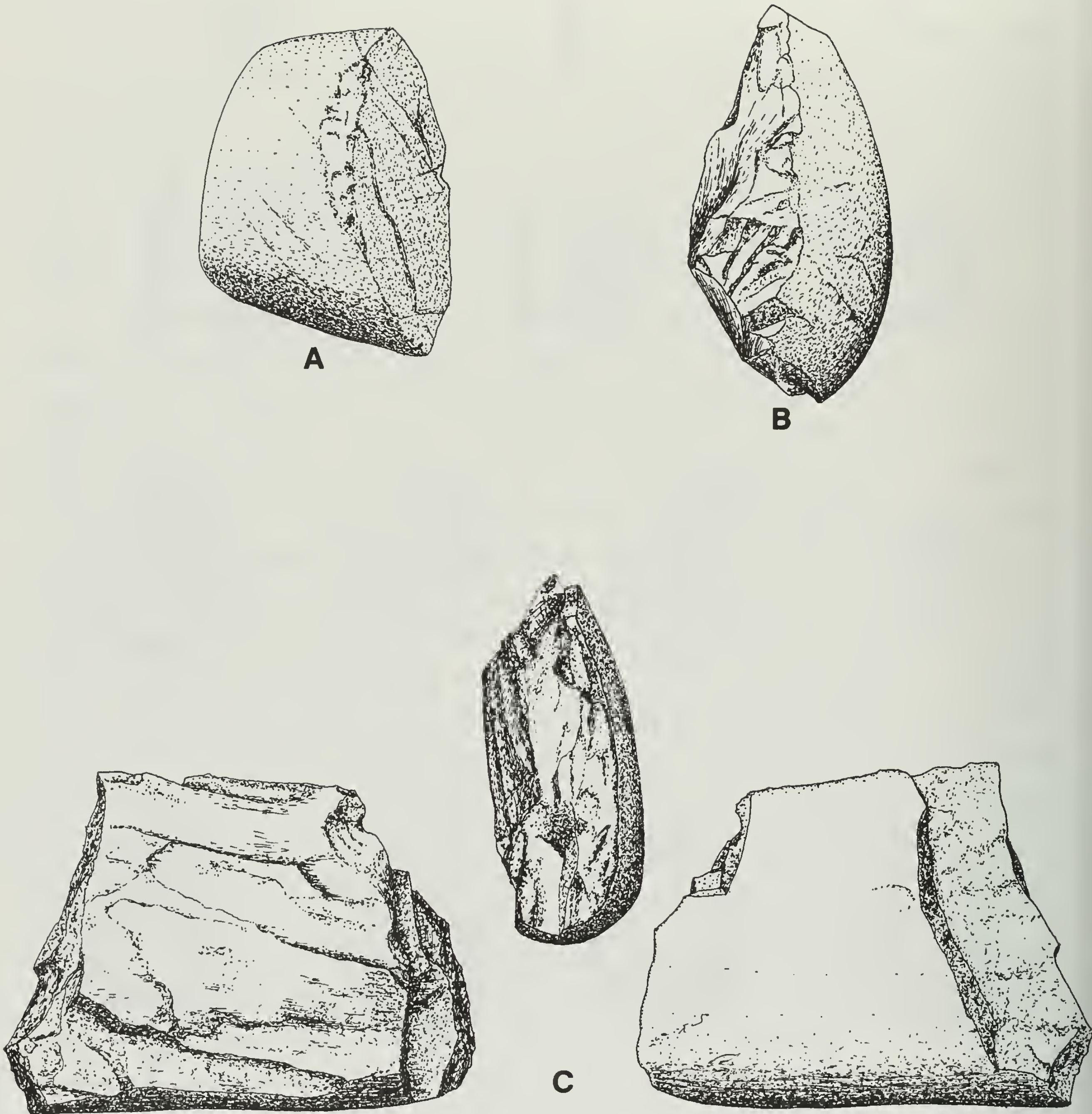


Figure 23.

Feature 9 artifacts.
A: Cobble fragment - hammerstone. B: Primary cortex chopper. C: Cobble fragment, primary cortex - hammerstone. Artifacts are to scale.

A

B

Figure 24.

Artifacts from Feature 9.
A: Mano. B: Mano. Pecked on both surfaces, recycled into a hammerstone. Artifacts are to scale.

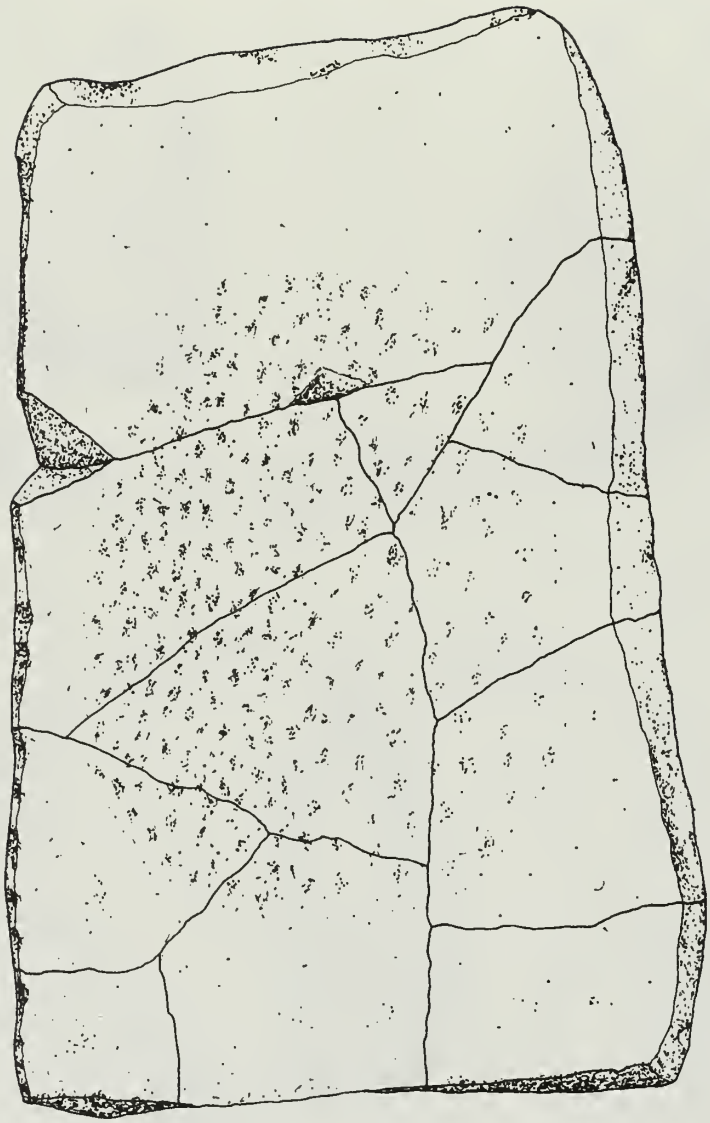


Figure 25.

Fragmented metate from Feature 9.
Pieces were found scattered in the floor of the feature. Thus, it is presumed that this specimen was part of an earlier assemblage and was incorporated into the construction of the feature (See Figure 11). Metate measures approximately 43 cm x 29 cm x 6 cm.

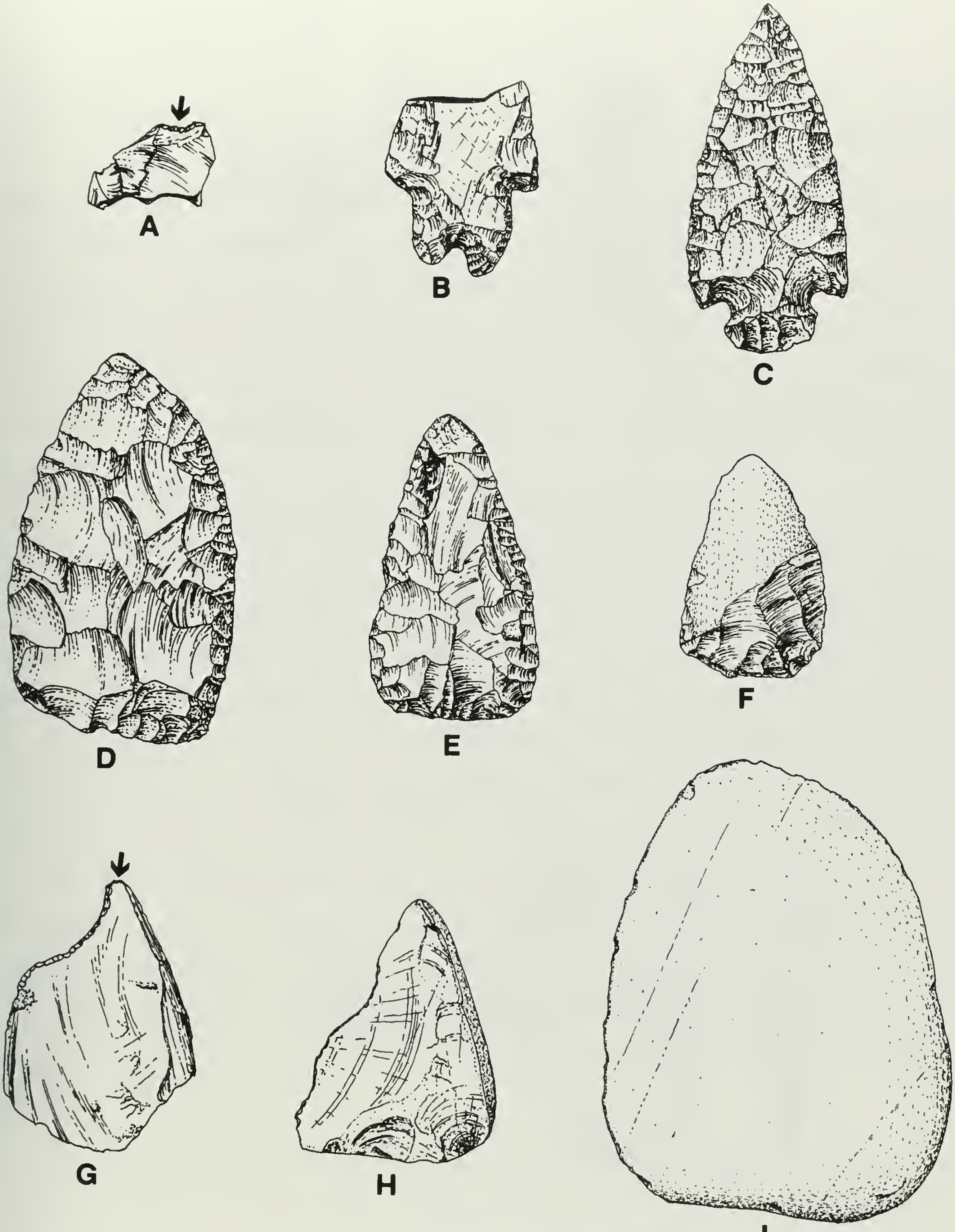


Figure 26.

Artifacts from Feature 9.
A: Notch (arrow). B: Middle Archaic Pinto shouldered projectile point. C: Late Archaic Tabeguache projectile point. D-E: Biface knives. These are the best specimens of bifaces from the site. F, H-I: Flake knives. G: Large spokeshave notch on a biface thinning flake with a narrow bit end scraper on one end (arrow). Artifacts are to scale.

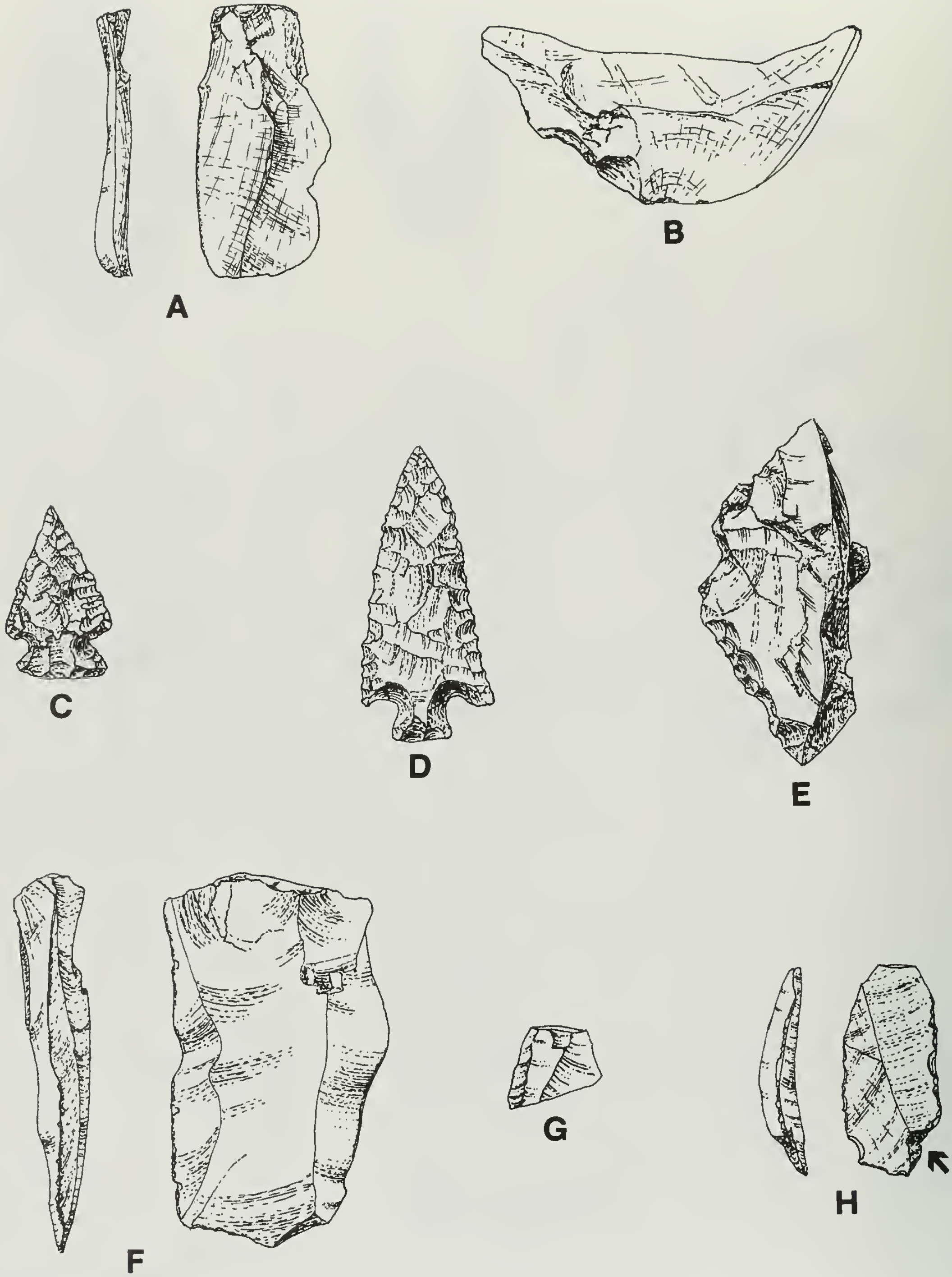


Figure 27.

Artifacts from Level VII not in floor context of Feature 9.
Specimens D-H are from general Level VII. A: Blade from Feature 16 exhibiting unifacial wear. B: Side scraper on primary flake from Feature 8. C: Elko side-notched projectile point from Feature 8. D: Elko Eared projectile point. E: Biface exhibiting scraper wear. F: Unifacially utilized blade. G: Utilized blade fragment. H: Unifacially utilized blade exhibiting notch (arrow). Artifacts are to scale.

Two flake knives (Figure 28b and c) were recovered from the general level and display extensive wear. From Feature 28 of the level is a projectile point (Figure 28a) and a composite scraper (Figure 29a) from the general level. Figure 29b is a graver and Figure 29c is a dihedral burin spall. Figure 29d and e are burnishers and Figure 29f is a chopper/hammerstone. There are also two mano fragments from the general level (Figure 30a and b), both of which are fire cracked.

In general, the distinctions between artifacts from the floor context of the habitation and general Level VII are a diminished size of projectile points, larger and less utilized blades, an absence of bifaces and a reintroduction of burnishers. The tool count for upper Level VII is more reminiscent of the assemblage in Level IV than for the habitation floor.

Level VIII

Level VIII exhibits a distinctively different tool assemblage from the previous levels. There is an increased number of projectile points (Figure 31d-g). The projectile point illustrated in Figure 31g is probably a displaced specimen and belongs in another occupation. The drill (Figure 31a) is the only drill recovered from the level. Specimens shown in Figure 31b and c are denticulate tools that exhibit scraping facets, notches and gravers. There is a large collection of biface fragments from Level VIII (Figure 32a-f). All of these fragments exhibit subsequent utilization of either bifacial or unifacial wear. They are all of different materials and cannot be conjoined.

This level possesses the first evidence of a "Fremont" occupation. Unfortunately, none of these artifacts have definite feature associations. Presumably, the 1010 $\pm$ 55 B.P. (DIC-1662) from Feature 31, Area A, and the Area C dates of 1210 $\pm$ 50 B.P. (DIC-1663) and 520 $\pm$ 55 B.P. (DIC-1657) from this level constitute cultural events that are consistent with the artifact assemblage from this level.

Level IX

This level produced no radiocarbon dates; however, the stratigraphy of the site is such that the upper level deposits are thinner. Consequently, the tools from this level may be of a different occupation but of the same cultural group as Level VIII.

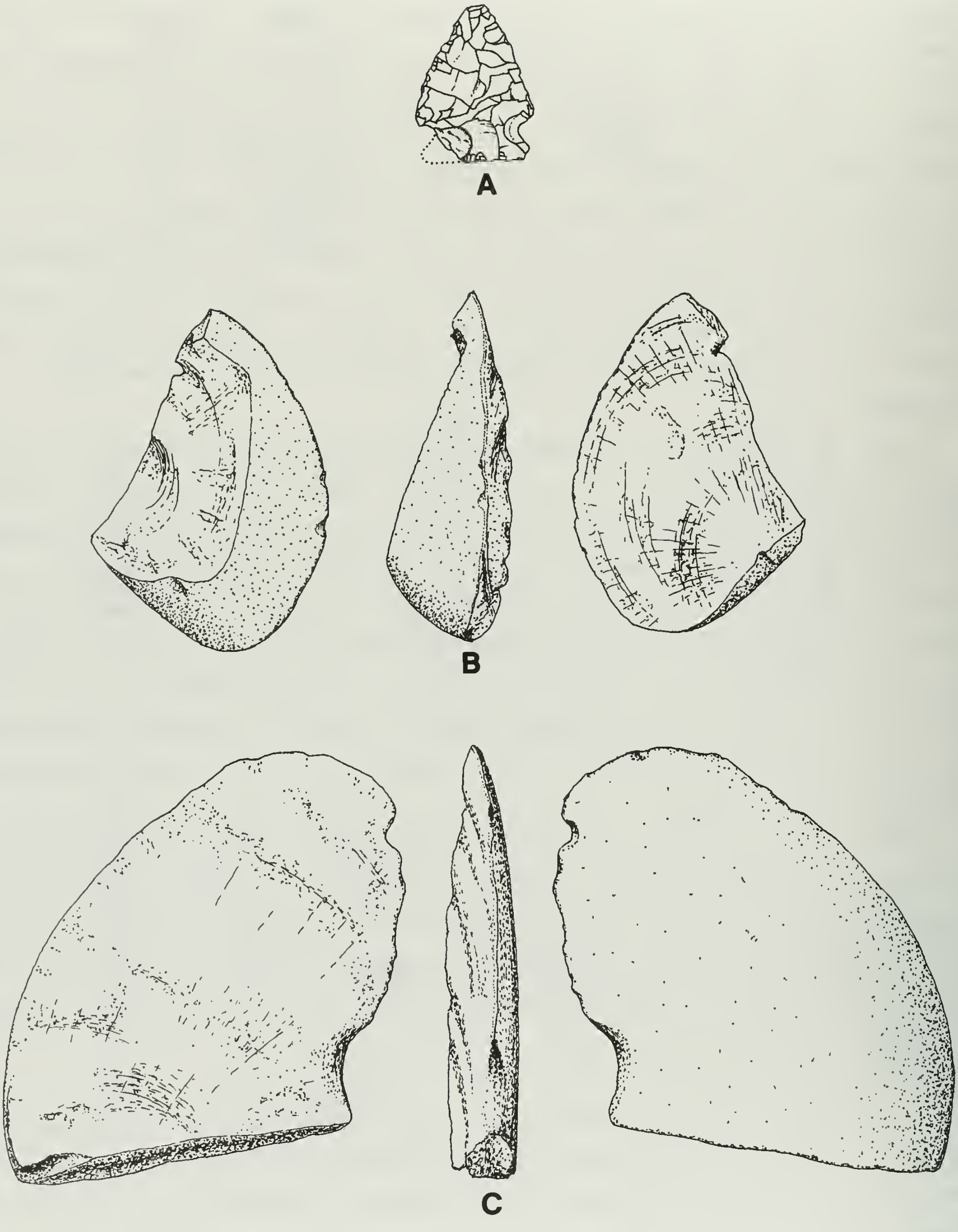


Figure 28.

A: Elko side-notched projectile point from Level VII, Feature 28.
B-C: Flake knives from general Level VII. Wear is exhibited on the curved edges of both specimens.
Artifacts are to scale.

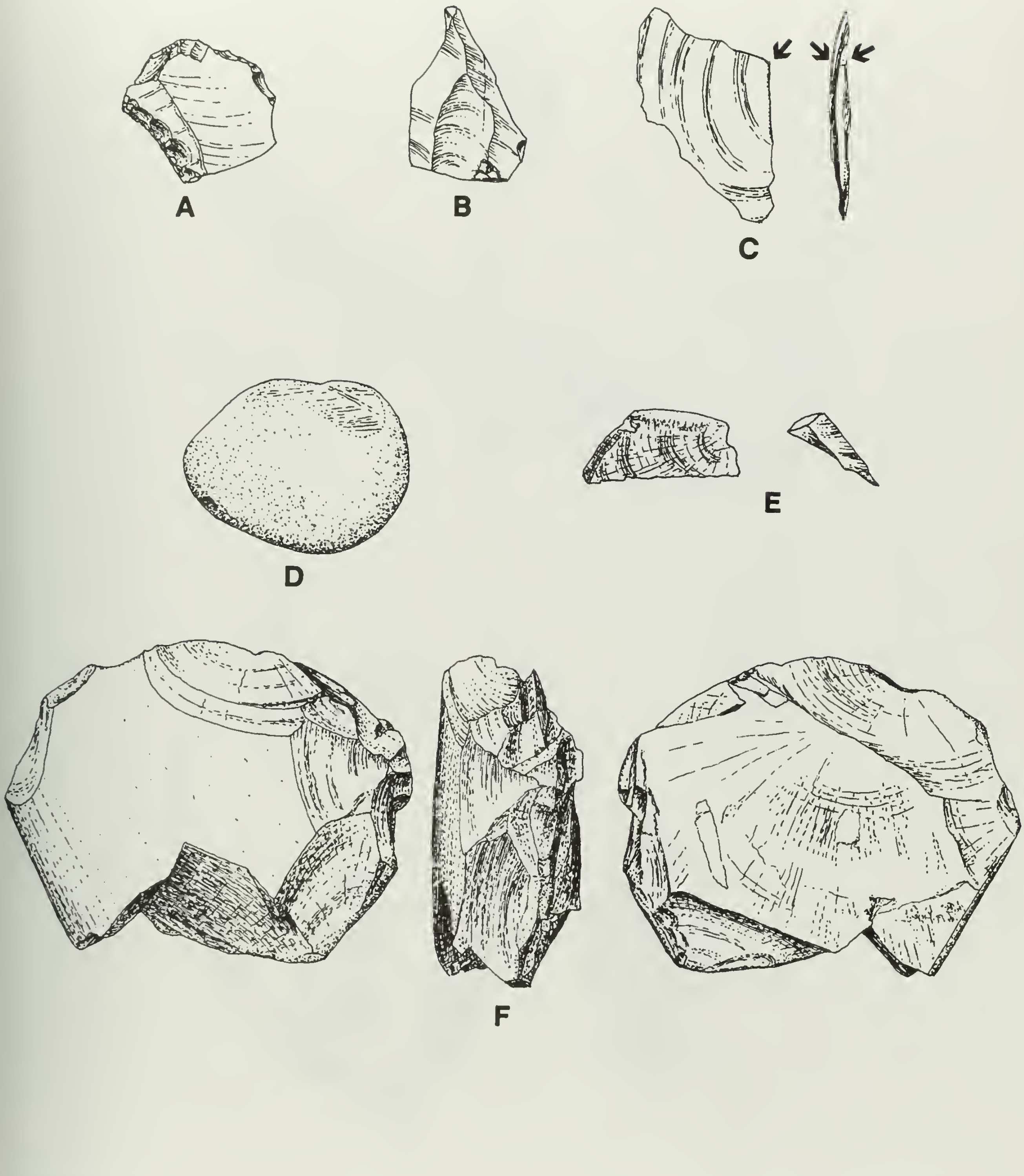


Figure 29.

Additional tools from general Level VII.
A: Scraper. B: Graver. C: Dihedral burin spall (arrows) with side and front view of burin facet.
D- E: Burnishers. F: Chopper/hammerstone. Artifacts are to scale.

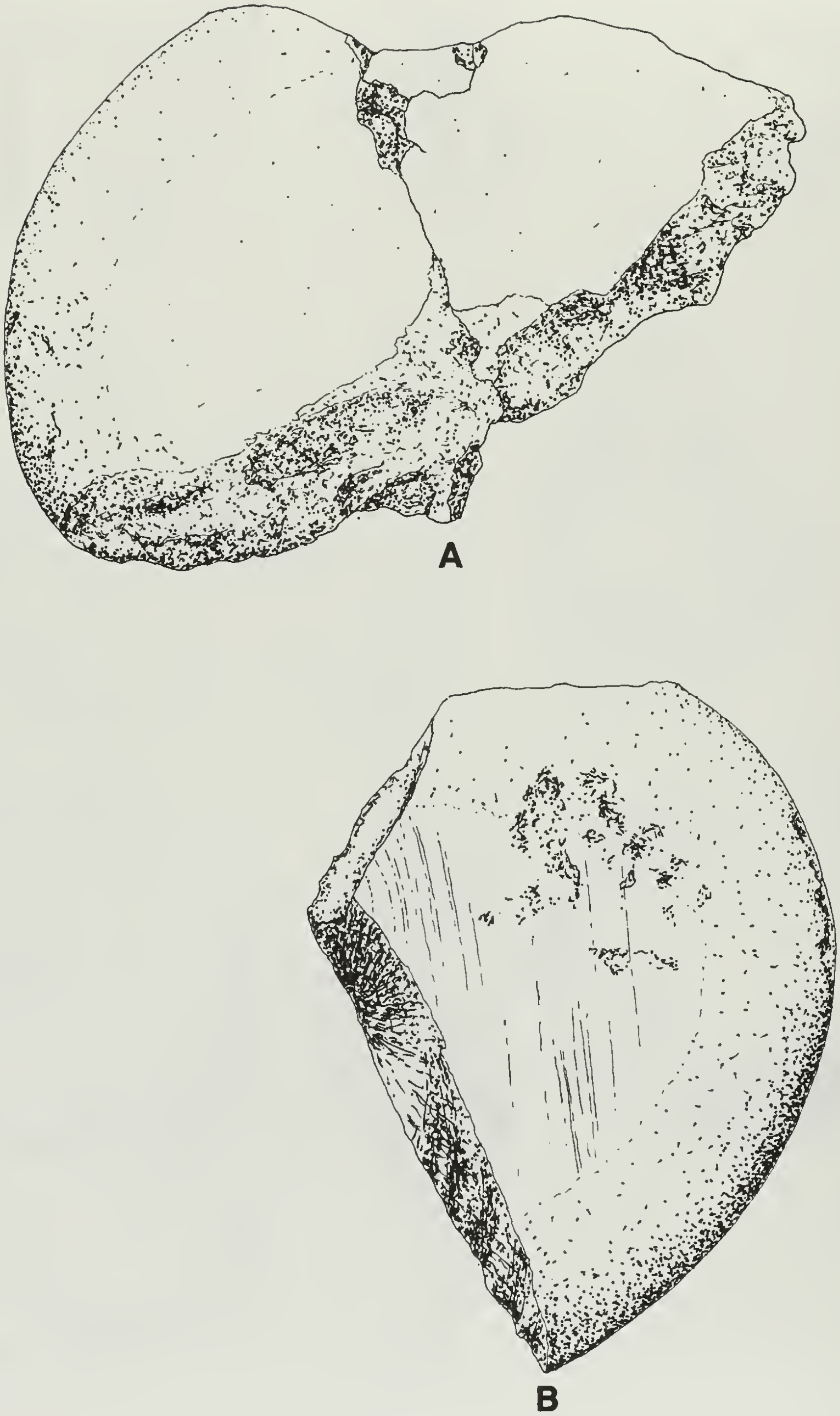


Figure 30.

**This figure illustrates groundstone fragments from general Level VII.
A-B: Fire-cracked mano fragments. Artifacts are to scale.**

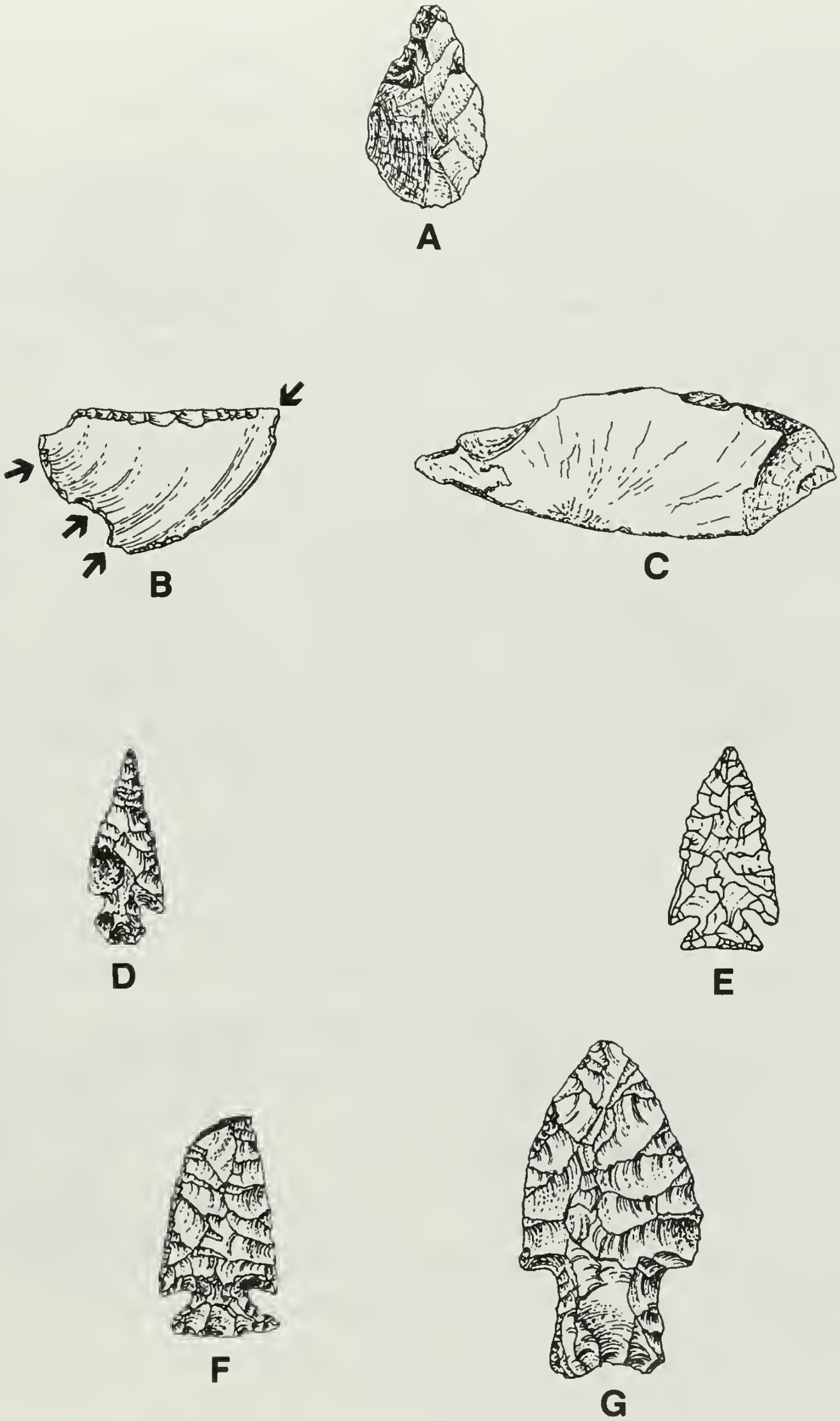


Figure 31.

Artifacts from Level VIII.
A: Biface drill. B-C: Flake tools that have been heavily utilized. Specimen B possesses a scraping facet, notch and graver. Specimen C has a spur and a graving facet. D: Rose Spring (Fremont) projectile point. E-F: Elko side-notched projectile points. G: Excellent specimen of Middle Archaic Pinto shouldered (Hanna) projectile point, which is undoubtedly floated up from a lower level. Artifacts are to scale.

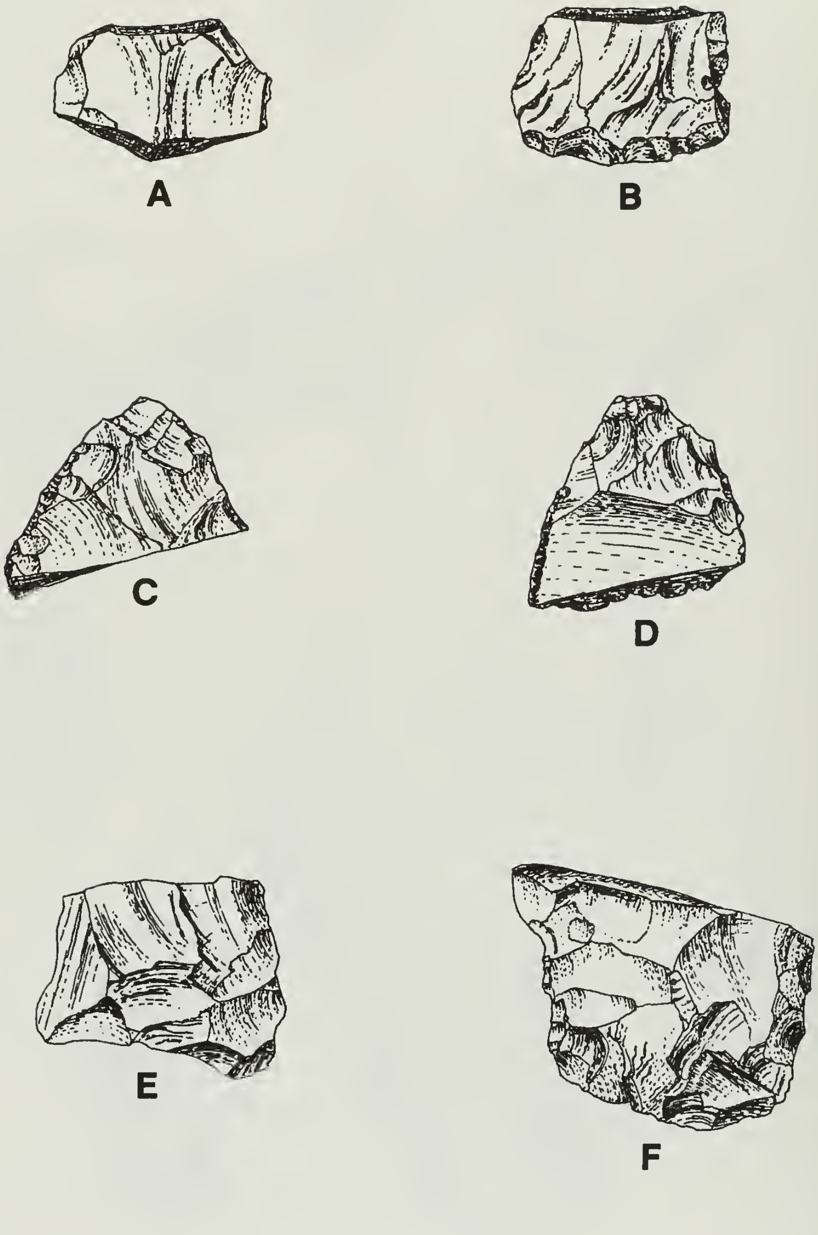


Figure 32.

A-F: Biface fragments from Level VIII.
Specimens B-D exhibit definite evidence of subsequent utilization, not immediately obvious on the others.
Artifacts are to scale.

Level IX contained incising tools such as a drill, beak, spur and the burinated end scraper (Figure 33a, c, f-g), scraping tools such as those shown in Figure 33d-e, h-i and a biface fragment (Figure 33b) which exhibits a haft snap. This level shows an increase in the number of multi-functional tools and a flake knife (Figure 34a).

Level X

Level X, the uppermost level of the site, yielded a large number of tools, including projectile points (Figures 35b, 36b-d, 37a-e). This level produced projectile points from that area which are not correct stratigraphically. The issue will be discussed more thoroughly in the interpretations.

Level X also produced incising tools (Figure 35d, 38a), a denticulate (Figure 38b), scrapers (Figure 35e, 38g), flake knives (Figure 35g-i), blades (Figure 38c-d), backed blades (Figure 38e-f), chopping and hammering tools (Figures 35f, 36a), and a mano fragment (Figure 34b).

Surface

Surface artifacts are included here more as an indication of a comparison of tool frequencies than an attempt at interpretation. The one projectile point from the surface (Figure 39a) is of an unusual variety and is discussed in the projectile point section. Included in the assemblage are two flake knives (Figure 39b-c) recovered from Area A. An unusual scraping tool, identified here as a pulping tool (Figure 40a), is characterized by the unique direction of the flake and attrition scars. Also included are one mano fragment (Figure 40b), scraping tools (Figure 41b-e), one multi-functional tool (Figure 41f), a notch (Figure 41a) and a core remnant (Figure 41g).

Chipped Stone Tool Summary

Probably the most important observation of the chipped stone tool assemblage is not the typology or any perceived difference in percentages of tool types. Rather, the most obvious observation is that this tool assemblage is composed predominantly of retouched flake tools, as opposed to formal morphological tools. This is borne out in the lithic analysis by the large numbers of tools that display cortex, the relatively small number of biface thinning flakes, the unusually small number of trimming and retouch flakes, and the fact that the formal morphological tools are almost

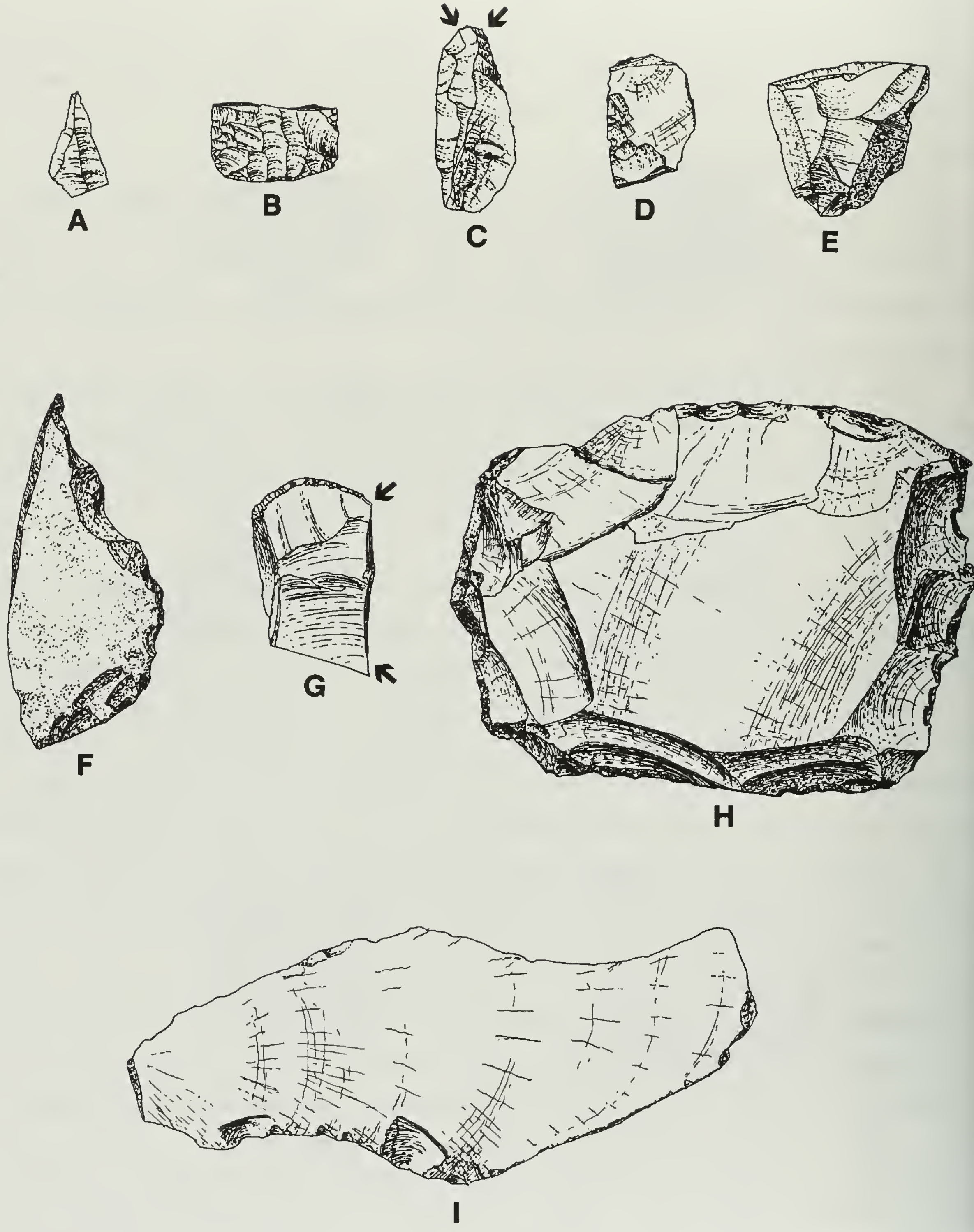
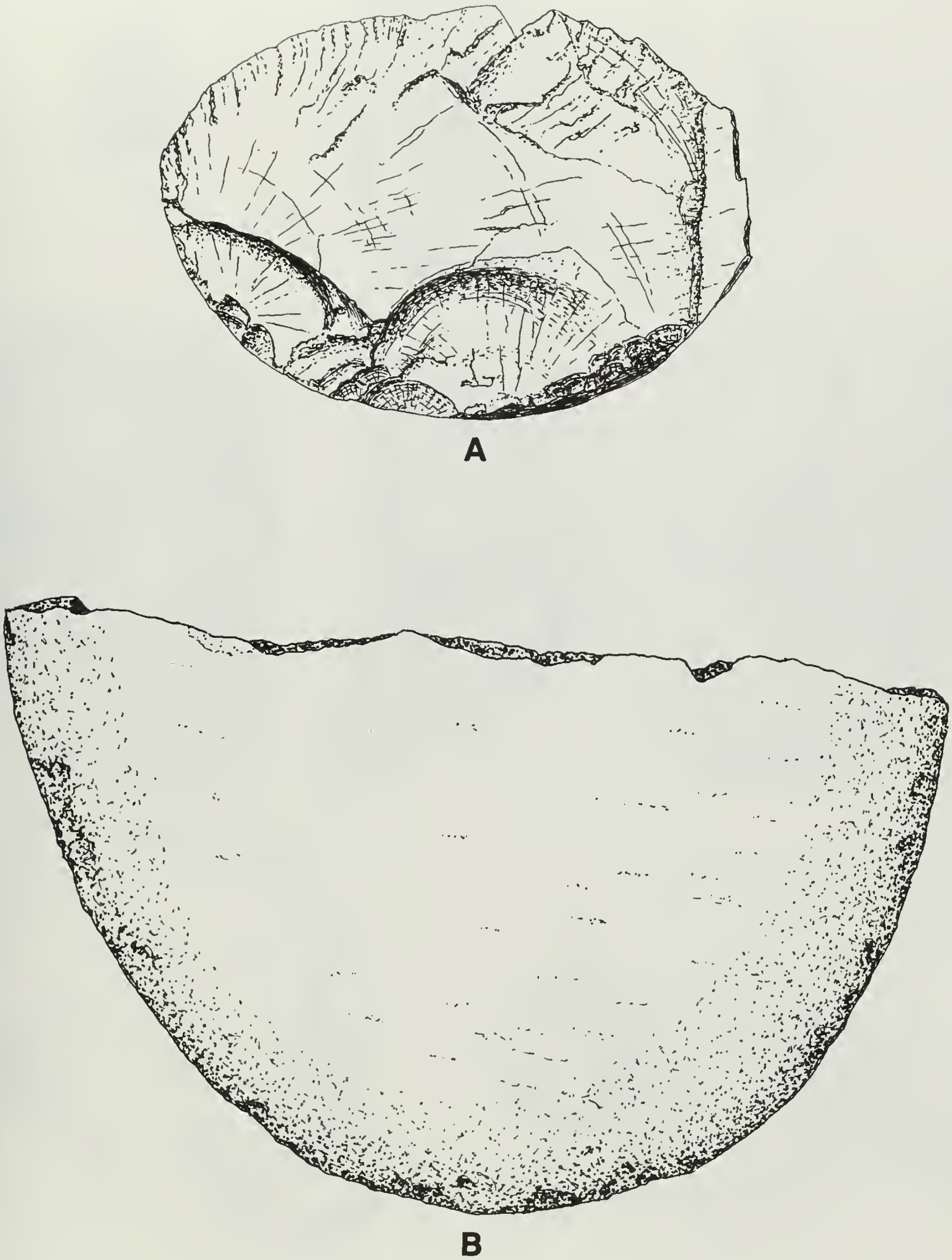


Figure 33.

Level IX artifacts.
A: Drill. B: Biface. C: Beak (arrows). D: Side scraper. E and G: End scrapers. Specimen G has burin scar (arrows). F: Spur. H and I: Multi-functional tools. Specimen H fits the definition of a flake knife. Artifacts are to scale.



A

B

Figure 34.

A: Flake knife from Level IX.
B: Mano fragment from Level X. Artifacts are to scale.

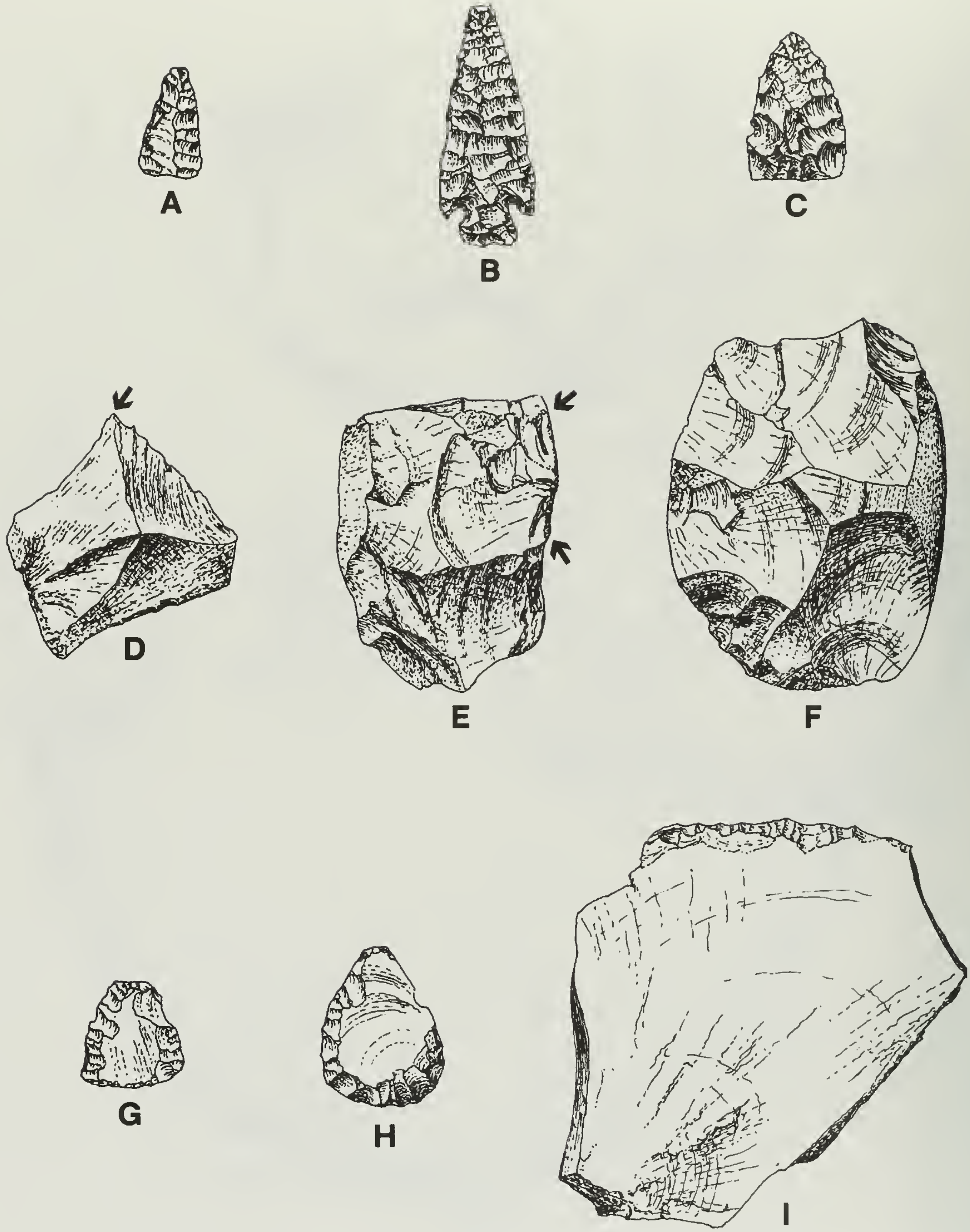


Figure 35.

All specimens are from Level X.
A. Projectile point tip. B: Rose Spring (Fremont) projectile point. C: Biface knife. D: Beak (arrow).
E: Scraping facet (arrows) on utilized core. F: Cobble chopper. G-I: Flake knives. Artifacts are to scale.

Figure 36.

Additional artifacts from Level X.
A: Four views of a hammerstone that is the best example of this tool category. Almost all surfaces exhibit battering. B: Elko Eared projectile point. C-D: Rose Spring (Fremont) projectile points. E: Unifacially modified and utilized flake. All artifacts are to scale.

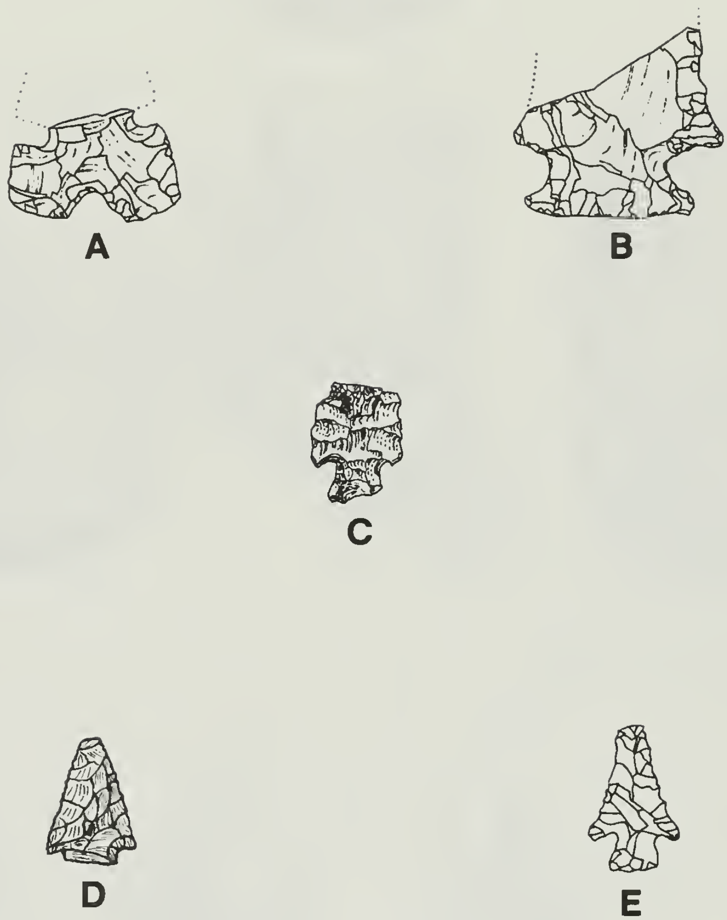


Figure 37.

Projectile points from Level X.
A: San Rafael side-notched projectile point. B: Side-notched knife. C: Rose Spring (Fremont) projectile point. D: Uinta side-notched (Fremont) projectile point. E: Rose Spring (Fremont) projectile point. All artifacts are to scale.

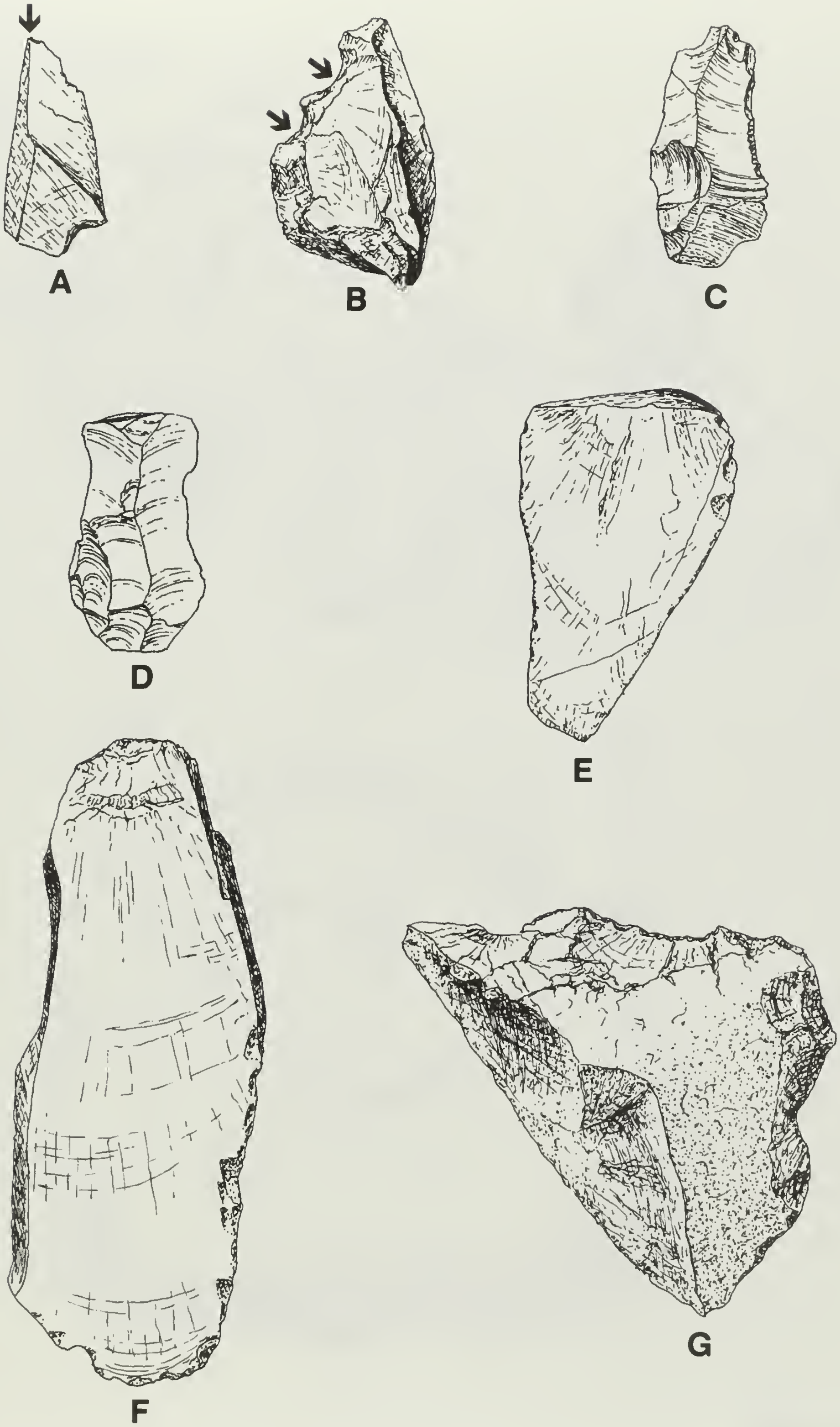


Figure 38.

Level X artifacts.
A: Spur (arrow). B. Denticulate (arrows indicate notches). C-D: Blades. E-F: Backed blades. G: Scraper. All artifacts are to scale.

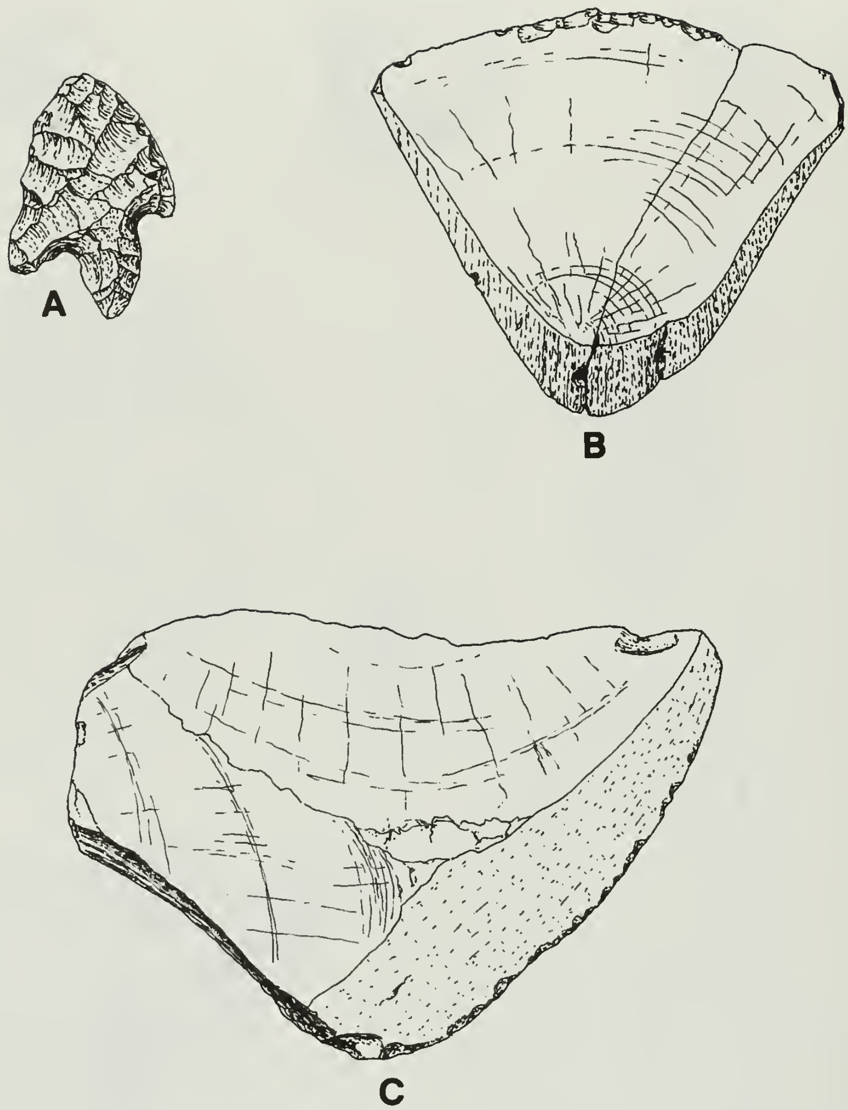


Figure 39.

Surface artifacts.
A: Middle Archaic Pinto single shouldered projectile point from Area A. B-C: Flake knives. All artifacts are to scale.

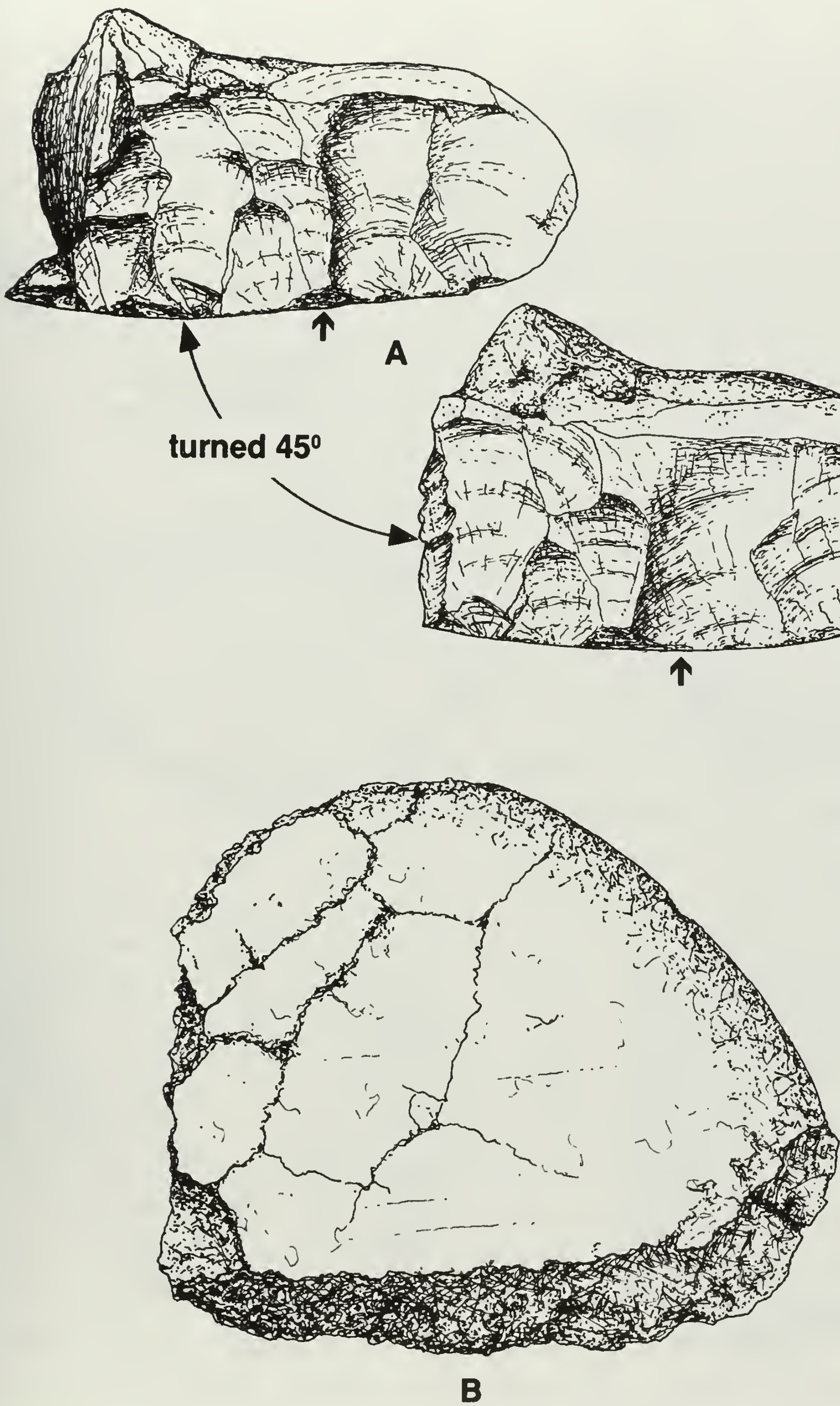


Figure 40.

Additional Surface artifacts.
A: Pulping tool. The two illustrations of the tool represent a 45⁰ turn of the axis of the tool. Flake scars are running from the bottom to the top (direction of arrows). This intentional flaking is presumed to have created a scraping edge along the flat bottom of the tool. Presumably, the scraping motion was effected by pushing the tool away from the body, which created a shredding motion of resources such as yucca leaves.
B: Fire-cracked mano fragment. Artifacts are to scale.

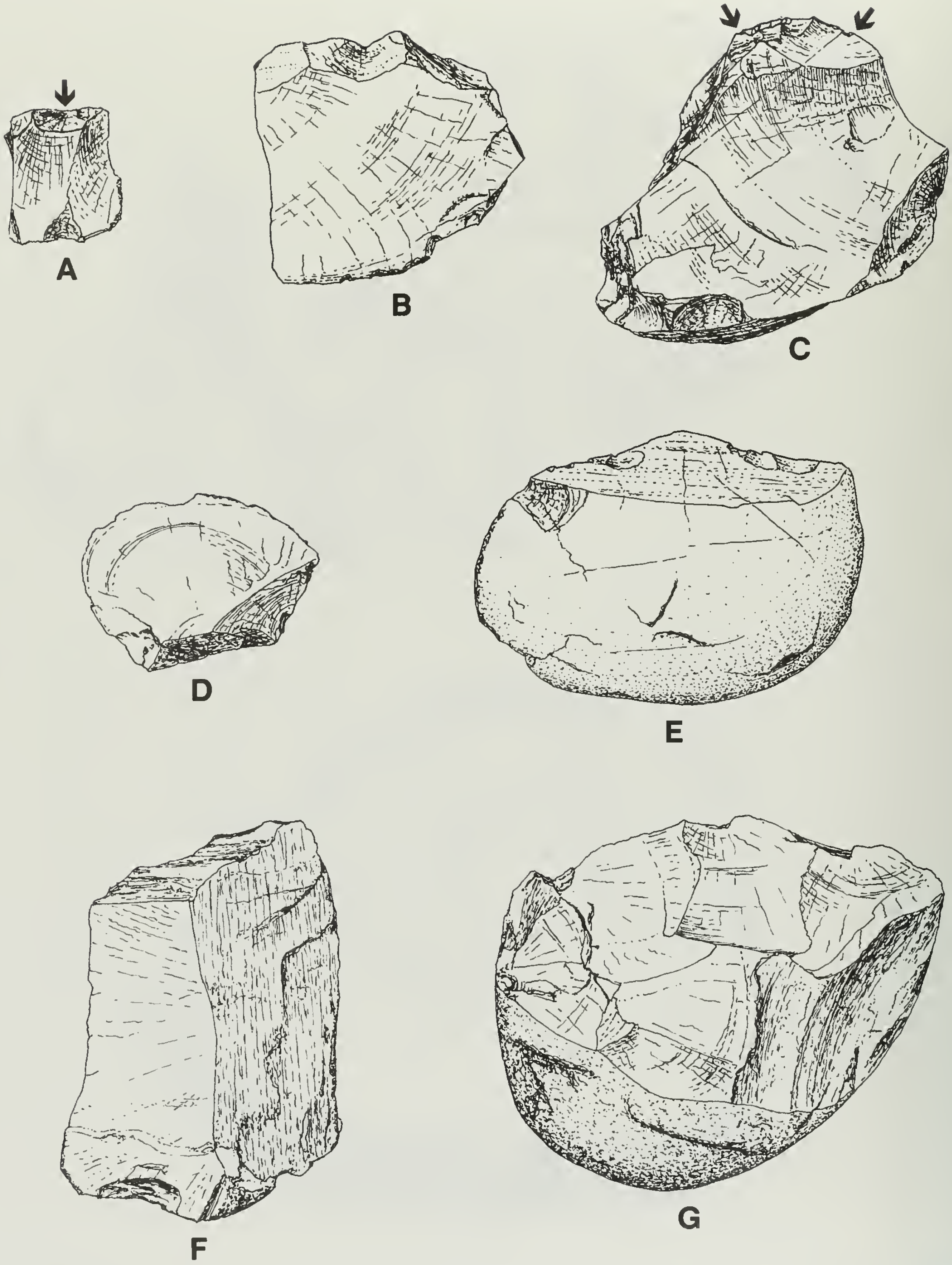


Figure 41.

Additional artifacts from the Surface.
A: Notch (arrow). B: Side scraper. C: End scraper (arrows). D-E: Flake scrapers. F: Multi-functional tool
G: Core remnant. All artifacts are to scale.

always cryptocrystalline, whereas the flake tools are of quartzite, metasediment and miscellaneous material types. This observation is important when these tools are compared to the tool assemblages from the Moore, Taylor and Casebier sites (Wormington and Lister 1956). The tools illustrated there include Uncompahgre scrapers, knives and adze-like scrapers (Wormington and Lister 1956:16-22). Like the tools retrieved from Sisyphus Shelter, these are large flakes with edge retouch and only partial and unpatterned biface reduction. They appear to be hand-held tools that display edge wear on most or all edges. Further, two bifaces from the Taylor site (Wormington and Lister 1956:44-45) exhibit the same characteristics of unfinished tools or unpatterned production techniques.

Buckles (1971:1178-1179) argues that these Uncompahgre scrapers and adze-like tools are not diagnostic of the Uncompahgre Complex; rather, they are miscellaneous unfinished products and are unique to the Moore, Casebier, Taylor and Alma Sites. The data from Sisyphus argue against that position on the basis of two points. First, the material types for the finished tools, such as projectile points and end scrapers, are different from the material types of the retouched flake tools. Second, the flaking techniques of the projectile points are radically different from those of the retouched flake tools. The projectile points are the result of a biface reduction technology; the retouched flake tools are the result of minimal retouch of fortuitous flakes. In this respect, the chipped stone assemblage from Sisyphus Shelter is extremely analagous to the Moore, Taylor, Casebier and Alma sites, and if the Uncompahgre scrapers and adze-like tools are not indicative of the Uncompahgre Complex, they are indicative of a lithic reduction technique that is characteristic of the Uncompahgre Complex. The point of comparison for this technology for the area is the postulation by Indeck of the biface reduction technology at the Zephyr Site (Indeck and Kihm n.d.). The occupation of the Zephyr Site was at least partially contemporaneous with the Uncompahgre Complex. In fact, the closest analogs for the projectile points were associated with the Roubideau phase of the Uncompahgre Complex (Indeck and Kihm n.d.:31). This would suggest that analysis of the lithic reduction techniques may help to distinguish the Uncompahgre Complex, where projectile point stylistic analysis cannot.

Projectile Point Interpretations

The 23 projectile points are separable into ten identified types and one unidentified type. Because of the elements of mixing at the site, some of the point styles with numerous specimens are mixed into various levels. Consequently, they are discussed here by type with reference to their stratigraphic provenience in the discussion.

Figure 42, Projectile Point Styles by Level, is a schematic representation of recognized point styles retrieved from various levels. Arrows for some specimens indicate the range for the location of the projectile point. This was necessary because of the unevenness of the various deposits. Those projectile point outlines that do not possess range arrows are located as closely as possible to their precise stratigraphic position within the level.

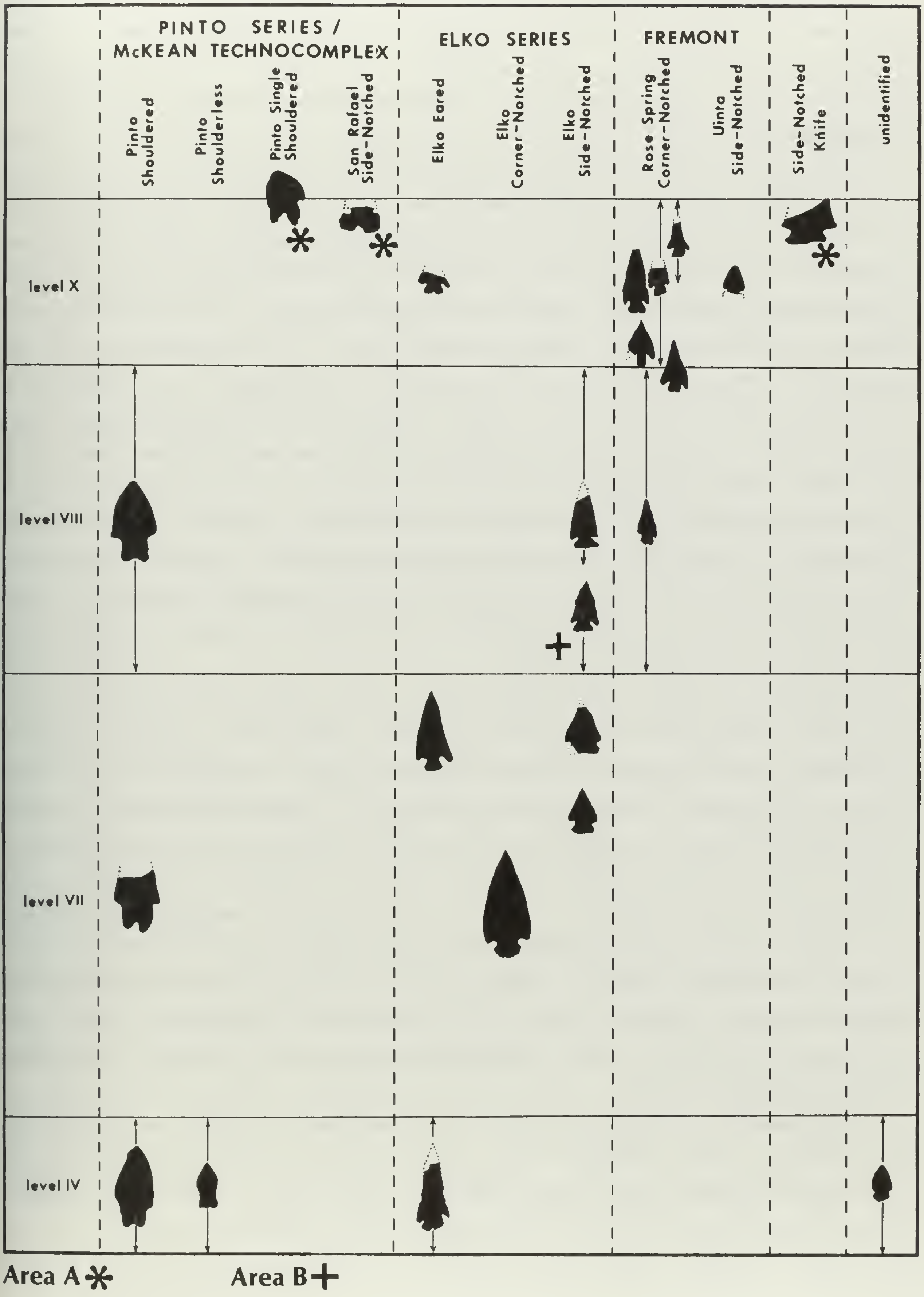
Those projectile points that are indicated with an asterisk (*) are from Area A. It is important to note that they are located at or near the surface. This is because the cultural deposits were extremely shallow and on bedrock. Therefore, the occurrence of the point style in Area A is a more important consideration than the stratigraphic position of these point styles relative to their placement on the schematic diagram. Area A was obviously a Middle to Late Archaic period occupation and had very little or no subsequent cultural or material deposition. The projectile point indicated by a plus (+) was recovered from the test pit in Area B.

With these considerations in mind, the presumed sequence of point style distribution at the site is Pinto Series, followed by Elko Series and succeeded and terminated by Rose Spring and Uinta points.

Pinto Series

The specimen deepest in the deposits (Level IV) is a Pinto shoulderless point (not illustrated), also known as a Duncan-variety point of the McKean Techno-complex of the northwest Plains (Frison, Wilson and Wilson 1974). This is one of the six specimens of the Middle Archaic period. Other specimens are found in Levels IV, VII, and VIII, all Pinto shouldered (Figures 20b, 26b and 31g, respectively), and from Area A, Level X, a Pinto single shouldered (Figure 39a) and a San Rafael side-notched point (Figure 37a). Unfortunately, the dispersal of these specimens does not contribute to any definitive use of them as horizon markers except to say that there is a feature date in Level IV of 3480 $\pm$ 160 B.P. (DIC-1801).

Figure 42.
Projectile point styles by level.



Also in Level IV was an unidentifiable side-notched point (Figure 20a) that is less massive than most of the other projectile points in the collection. Presumably, this specimen is misplaced stratigraphically through natural forces and belongs in the assemblages of the higher levels.

Elko Series

Stratigraphically, the next type that is first encountered is the Elko Eared, represented by three specimens. One is in Level IV (Figure 20d), and one is in Level VII (Figure 27d). The third specimen (Figure 36b) was retrieved from Level X, which represents significant displacement. Holmer (1978:62-65) suggests that Elko Eared projectile points are associated with dates in the 3600-3300 B.P. range at Cowboy Cave, and from 4600-1260 B.P. at Hogup Cave. This is consistent with the dates for Feature 9 in Level VII.

Located in Level VII is a single Tabeguache point (Figure 26c), also known as Elko corner-notched (Holmer 1978:34; see also Husted and Edgar 1968:Plate 19L; Wormington and Lister 1956:53). Elko corner-notched is quite variable in style and temporal distribution throughout the Colorado Plateau, and with regard to stratigraphic associations, does not appear to be a valuable horizon marker. This style of projectile point was first recorded by C. T. Hurst at Tabeguache Cave (1941:12) wherein he refers to the site as peripheral Basketmaker.

Comparison of the collections from site 5GF126, the Kewclaw Site (C. Conner, personal communication 1983), with the projectile point assemblages from Sisyphus Shelter indicates that the artifacts from the floor of Feature 5, the pithouse at 5GF126, are defined regionally as Elko corner-notched. The occurrence of this point style in the archaeological record associated with dated features, such as Feature 5 at 5GF126 with radiocarbon dates of 2900 $\pm$ 60 B.P., 2770 $\pm$ 60 B.P. and 2500 $\pm$ 100 B.P. (C. Conner, personal communication 1983), and the Dotsero burial (5EA128) with a radiocarbon date of 2910 $\pm$ 55 B.P. (Hand and Gooding 1980:29) suggests that perhaps a more finely determined subregional type (the northeast end of the northern Colorado Plateau) may be developed for these corner-notched points.

Data compiled by Holmer (1978:72) suggest that the Elko corner-notched point has at least a 7500-year time range with two hiatus points of at least 500 and 1000 years, respectively. This does not seem to be the case in the

upper Colorado River drainage, where the Plateau meets the mountains. It would be useful in the future to dispense with a type name that has such little interpretive value.

In Level VII, there are two Elko side-notched points (Figures 27c and 28a) and two in Level VIII (Figure 31 e and f). The Elko side-notched was first defined by Heizer, Baumhoff and Clewlow (1968) wherein it was believed to be developed from the Elko corner-notched. Holmer (1978:62-65, 72) suggests that the Elko side-notched may have been developed simultaneously with Elko corner-notched and is indicated by the same hiatus points as the corner-notched point. The stratigraphic location of this point type is well defined in Levels VII and VIII and would suggest terminal Archaic period occupation.

Rose Spring and Uinta

The Fremont styles are limited to the upper levels of Area C and consist of the largest number of specimens (8) represented by two types. The first type is the Rose Spring corner-notched, first defined by Lanning (1963) (see Figures 31d, 36c-d, 35b, 37c and e). Rose Spring projectile points are found at Cowboy Cave, dated there at approximately A.D. 300, and at the Levee Site, O'Malley Shelter and Deluge Shelter (Holmer and Weder 1980:56-59).

In Level X is a point with a half snap that appears to be a Uinta side-notched point (Figure 37d). This type dates fom A.D. 800-1200 and is found in the northern end of the Colorado Plateau (Holmer and Weder 1980:60). The combination of these two Fremont point types suggests a San Rafael/Uinta Fremont occupation, after the definitions by Marwitt (1970) and Berry (1975).

Side-notched Knife

This particular point base (Figure 37b) is not a typical point style for the region or the time period with which it is placed stratigraphically. The source of this projectile point was Area A, which had extremely shallow deposits; consequently, its stratigraphic position has little meaning.

There is a general resemblance of this point type to Types 23 and 24 identified by Buckles (1971:1220) as part of the Roubideau Phase, specifically specimens from Christmas Rock Shelter (5DT2) and Shavano Springs Site (5MN40). The latter site produced a radiocarbon date of 2695 $\pm$ 180 B.P. (Buckles 1971:960). The correlation with Roubideau Phase sites is logical given the locations of these four sites; however, short of

comparison of the actual materials, this associaton must remain tentative. It may be important to note that some side-notched points identified by Frison (1978) are associated with a highly developed bison procurement subsistence pattern. There were bison remains recovered from Sisyphus Shelter, and even though they were small in number, bison remains from rockshelters in this region are extremely rare.

It appears that this style of point is in context with Late Archaic period occupation. Obviously, additional data need to be accumulated from this region before more definitive interpretations can be made.

Perishables

During the early excavation in Area C, two perishable items were recovered from grid unit C/4, Level X. The first was a basketry fragment (Figure 43b). The fragment is close-coiled with noninterlocking stitches on a split rod and lateral bundle foundation. The specimen is of unknown form and does not possess any rim or center elements. Before cross-sectioning, the specimen was 5.9 cm in length and 1.5 cm in width, with a thickness of 0.55 cm and a weight of 2 g. The coils are of uneven range, varying between 0.61 and 0.71 cm in diameter, with a range of 1 to 1.5 coils per centimeter. The work surface and direction are unknown. Stitch types are noninterlocking and aligned vertically. The work surface and nonworked surface are both unsplit. The stitch engagement of the coil pierces the bundle. The stitch widths are unequal, ranging from 0.12 to 0.19 cm with a range of 3.5 to 4.5 stitches per centimeter and a stitch gap of 0.05 to 0.18 cm. There is a slight possibility of a splice movement of one moving end bound under. The stitches are of Salix sp. on a Yucca sp. bundle foundation.

The other specimen is an arrow nock (Figure 43a) that possesses a split twig base and a reinforced collar, apparently of yucca, of four coils. The material of which the nock is constructed is unknown. There is no interpretation of the break.

The stratigraphic evidence suggests that these materials are in context with Feature 2, which is presumed to be part of the seventh, or latest, occupation of the site. The construction of the basketry fragment does not fit any of the identifying categories established by Adovasio (1980:35-40) as any of the known types from the Colorado Plateau.

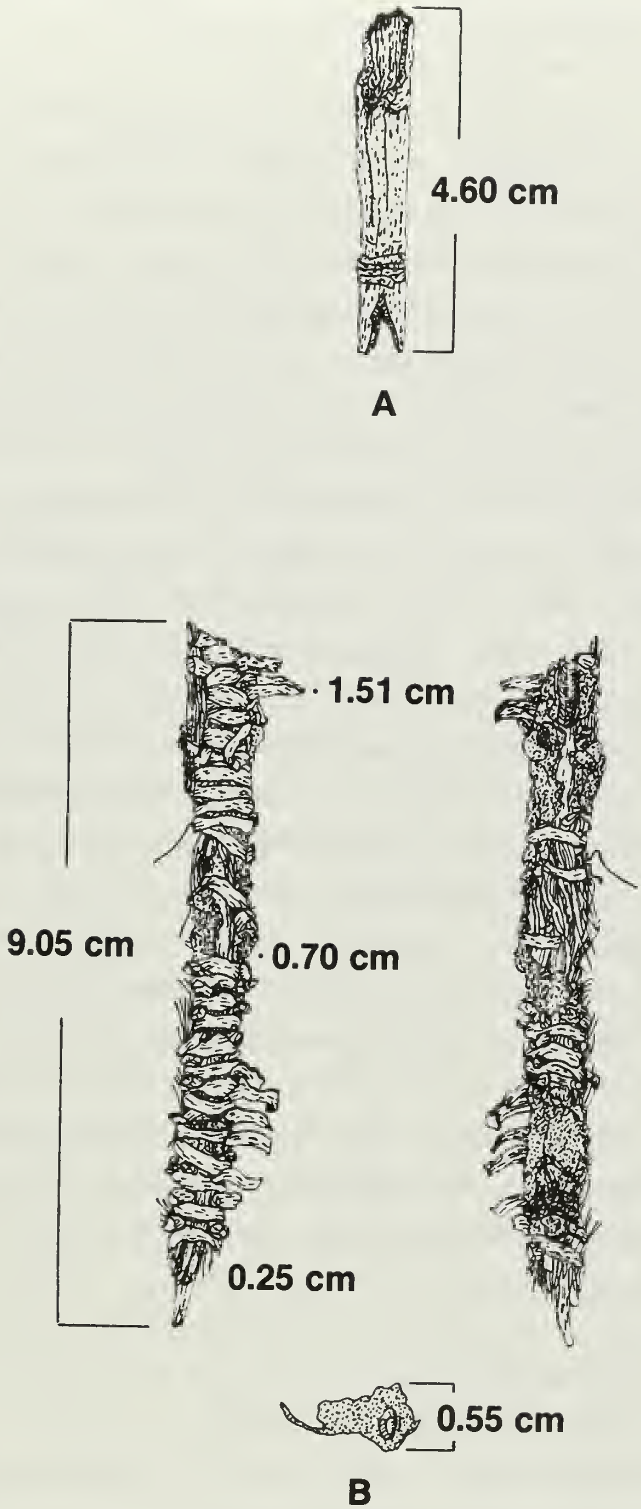


Figure 43.

Perishables from Level X.
A: Arrow shaft fragment with nock at lower end. B: Two views of basketry fragment showing detail of construction. Cross-section is shown at bottom.

Analysis of Faunal Remains from 5GF110, Sisyphus Shelter.

Site 5GF110, Sisyphus Shelter, lies within the Grand Valley of west-central Colorado. The immediate vicinity of the site is dominated by pinyon and juniper, with desert shrubland to the north and the Colorado River 1.5 km to the southeast. This mixture of ecologies produced a rich diversity of fauna available to occupants of the rockshelter.

The vast majority of the bone specimens came from the topmost soil, Level X of Area C (75 percent), with another 20 percent recovered between this layer and 30 cm below ground surface (Levels IX and VIII). The remainder of the specimens were widely separated stratigraphically.

The origin of the greatest concentration of bone in Level X is a mixture of cultural and rodent/predator accumulations. A modern, or only recently abandoned, woodrat nest occupies a crevass in the rockshelter. Many of the most recent-appearing bones were extensively rodent gnawed. Predator activity appears to have added to the fauna. Several rodent specimens are anomalous, either because they do not fit the local environment or because they are represented by a low number of elements. The occurrence of an owl in the faunal collection may account for some of this rodent material.

Although soil zone A (Levels X and XIII) also contains bones of cultural origin, the best examples of bone tools from the site are from the uppermost horizon, which appears to be time transgressive. In front of the rockshelter, Level X is very thin, containing bone that is quite recent in origin and post-occupation. The zone thickens toward the back of the shelter, where protection from the rocks has prevented erosion and slowed the compaction and cementation of the sediments. As a result, Level X in the deeper portions of the shelter contains both cultural and post-occupation material. The bone from below Level X is mostly cultural in origin.

Faunal Remains

Iguanidae, Iguanas and relatives.

3 specimens, at least one individual.

There is no evidence for any cultural affiliation of the lizard material. The specimens all have several bones in articulation and appear

to be quite recent in origin. Fence lizards (Sceloporus spp.) are common in the rockshelter, and the material probably belongs to one of these species of small lizards.

Strigidae cf. Bubo virginianus Great Horned Owl.

7 specimens, all from one individual.

A major portion of the skeleton of one individual was recovered. The skull and distal wing elements are absent. There is no indication of cultural activity associated with this specimen.

The specimens are referred to Bubo virginianus because of similar morphology and the ecology of the site. The only other two comparably large owls are the Barn Owl, Tyto alba, and the Barred Owl, Strix varia. Both prefer areas with more cover than is present in the open pinyon-juniper and grassland environment near the site.

Sylvilagus audubonii Desert Cottontail

40 specimens, at least four individuals.

Based on comparison of the cranial measurements given by Armstrong (1972:83), the specimens can be referred to Sylvilagus audubonii. A variety of skeletal elements are represented, both cranial and postcranial. There is little obvious evidence of use by man, although many of the bones show spiral fracture. Four limb bones show fine scoring on the shafts perpendicular to the long axis of the bone. These may be the result of defleshing activity. Specimen #1353, a left calcaneum, shows shallow grooves which may be cut marks made while severing the Achilles tendon and removing the tarsus.

Only two specimens show marks other than scoring. Specimen #1399, a right innominate, has a depressed fracture in the center of the iliac blade. This is similiar to the type of fracture described by Wheeler (1980:52-53). However, only one of the three innominates in the sample shows any fracturing, and there are no cut marks or scoring of the type that would be expected near the acetabulum had the individuals been dismembered by butchering. Possible evidence of butchering is seen on the three relatively complete femora. All three have the greater trochanter broken in a way that may be the result of the same butchering process.

Only one specimen (#1513) shows evidence of having been utilized. This is a shaft fragment of a right tibia, which appears to have been used as a punch similar to those described by Wheeler (1980:51).

Two long bone shaft fragments are burned. These are the only Sylvilagus specimens recovered from more than 30 cm below ground surface.

Lepus cf. L. townsendii White-tailed Jackrabbit

16 specimens, at least two individuals.

The specimens of Lepus are referred to this species based on the modern-day ranges of the species of Lepus in Colorado (see Armstrong 1972:87-94).

Only one specimen of Lepus shows the type of scoring seen on the Sylvilagus audubonii specimens. However, more of the Lepus material shows evidence of utilization. Specimen #1352 is the distal end of a right humerus in which the olecranon fossa has been enlarged. The specimen has been gnawed by rodents, so the question of its use is problematic. Specimen #1443 is also the distal end of a right humerus which shows evidence of being used as a punch. A small amount of polish is present on the broken edges of the shaft.

Two femoral fragments show modification. One specimen (#1505) has a high degree of polish on the ends as well as on the sides of the shaft. There is also a small notch where a blow from the outside of the bone took out a small flake. A second specimen (#1318) exhibits incision marks perpendicular to the long axis, coupled with a snap fracture. This end was then polished. In the opposite end of the shaft, a bone which appears to be the shaft of a radius (also Lepus) has been shoved into the marrow cavity. The femur shaft may have been a bead. The reason for the second bone being in the shaft is unknown.

Two tibia fragments were found to fit together. These were the only specimens of Lepus which were burned. When placed together, the specimens appear to have been a punch, with the tip showing some polish up to the point of breakage. Also at the point of breakage is a small notch where a bone flake was taken out. The force was directed from the marrow cavity out to produce the flake.

All the _Lepus_ material was recovered from Level X, and most was from the center of the deepest part of the rockshelter.

Neotoma cf. _N_. _cinerea_ Bushy-tailed Woodrat

2 specimens, two individuals.

Two left dentaries were recovered during excavation. The specimens were both from near the surface and are probably from the active nest in the rockshelter.

Neotoma cf. _N_. _lepida_ Desert Woodrat

1 specimen, one individual.

This specimen is an almost complete mummified individual. Based on measurements in Armstrong (1972:217), the specimen represents _Neotoma_ _lepida_ rather than _N_. _mexicana_, the only other small species of _Neotoma_.

The presence of two species of _Neotoma_ in the same rockshelter is somewhat puzzling. The rockshelter is near the edge of the range of _N_. _lepida_ (Armstrong 1972:220), and so the two species could be in direct competition in this area. Another possibility is that the two species represent occupation of the rockshelter during two different times and perhaps two different climatic conditions. A third possibility is that, because of the elements present, the _N_. _cinerea_ material may have been brought into the rockshelter by predators.

Tamiasciurus _hudsonicus_ Chickaree

1 specimen, one individual.

A single right dentary with P/4 and M/1 was recovered from the site. The occurrence of this species in the rockshelter is unexpected, because the normal habitat of the species is dense pine, spruce, or fir stands. The nearest such environment is on Battlement Mesa, approximately 3.5 km to the south. The specimen may have been brought to the site by a predator.

Sciuridae, nr. _Marmota_ or _Cynomys_ Marmot or Prairie Dog

1 specimen, one individual.

A left IV metatarsal is the only specimen of this larger sciurid recovered. Because of the rocky environment of the site, the specimen could represent _Marmota_. _Cynomys_ is more common in the area, but its presence in the rockshelter is less likely than that of _Marmota_ unless the specimen was carried in by a predator.

Procyon lotor Raccoon

1 specimen, one individual.

Specimen #1427, a left radius with the distal portion broken off, is the only indication of the species from the site. There was no evidence that the specimen is related to cultural occupation. The rockshelter may have been inhabited by a raccoon at one time, but in that case more elements of the skeleton would be expected. There is no rodent gnawing on the bone, so its occurrence in the rockshelter is somewhat anomalous.

Odocoileus hemionus Mule Deer

62 specimens, at least two individuals.

This species accounts for the greatest number of specimens in the fauna. It is also the species which shows the most cultural usage. Twenty-three of the specimens show cultural modification; fourteen of these are burned. Several of the specimens show scoring and cut marks; a few of the specimens show utilization.

Thirteen distal elements, metapodials, mesopodials and phalanges are present. This would imply that relatively complete carcasses were butchered at the site. However, only one scaphoid and four metapodial fragments were recovered, and the remainder of the material consists of phalanges and a single sesamoid. Three of the metapodial fragments exhibited modification, so these elements may have been saved preferentially for tool manufacture.

Eleven vertebral fragments were recovered. Only one was a vertebral body, the rest being either dorsal or lateral spines. This would indicate that the vertebral column was discarded either where the animal was killed or outside the rockshelter, where it was either not preserved or not recovered. The portions of the vertebrae that were found are the portions that would be broken during the butchering process as the larger slabs of meat were removed from the carcass.

Limb bone fragments are the most common type of element for this species. Most of these show either a green break or spiral fracture. Again, these elements would be associated with the larger portions of meat saved from a kill.

From the type of material present, it does not appear that entire carcasses were brought to the site for butchering. The bone fragments from the site represent all the elements associated with the larger portions of

meat from a carcass. Two antler fragments were recovered, but these were probably brought specifically for use as tools. The high number of phalanges may be due to their being left in the hide. The skin could then be used to carry the meat back to the site, with the feet being used as handles in the hide. The limb bones were then defleshed at the site and the bones broken for marrow extraction.

A few of the limb bones show utilization. One each of the tibia, radius and humerus fragments exhibit a slight degree of wear (polish), indicating possible usage as fleshing tools.

Two of the metapodial fragments were made into tools. Specimens #1471 and #1506 exhibit a high degree of polish and extensive scoring. Specimen #1471 is complete and appears to be a burnishing tool. Specimen #1506 shows the same type of wear but is fragmented.

<u>Ovis aries</u> Domestic Sheep

6 specimens, at least one individual.

None of the specimens of the domestic sheep were found at any depth. All were either on the surface or just subsurface. In addition, four of the elements are heavily rodent gnawed, so they were probably brought into the site by rodents. The ungnawed remains were tooth fragments found on the surface and a badly weathered tooth and a portion of the dentary. The occurrence of the species in the fauna is due to the historic and modern sheep-raising activity directly around the site.

<u>Bos taurus</u>/<u>Bison bison</u> Domestic Cow/American Bison

21 specimens, at least one individual; several of the specimens fit together.

The material present could represent either species. Most likely both species are present. The specimens found at depth in cultural context are probably <u>Bison</u>, while the surface specimens are most probably <u>Bos</u>. Only three of the specimens show modification. A fragmented, proximal portion of a left tibia shows spiral fracture and some slight charring. A second long bone shaft fragment also shows spiral fracture, and a possible pelvic fragment is heavily burned. No cut marks or scoring are in evidence, but most of the bone is weathered.

Only two specimens were recovered from below Level X. One was the first sacral vertebra of a juvenile. The second was the pelvic fragment described above. The relatively low number of specimens indicates little usage of bison during occupation of the rockshelter.

Unidentifiable Fragments

19 specimens.

Three specimens are burned, and one was found in association with Feature 9. The remainder of the material is weathered. Other than two specimens showing spiral fracture, none have cultural implications.

Summary

Faunal remains from 5GF110 constitute a relatively diverse assemblage which reflects the varied ecologies in the immediate vicinity of the site. The remains are a mixture of culturally and naturally accumulated bones, the majority of which are from the latest occupation of the site and/or post-occupation. Several species are thought to be represented in the fauna because of either rodent (Neotoma) activity, or because of a predator, possibly the owl recovered from the site.

The culturally associated bone material shows greatest reliance on the mule deer (Odocoileus hemionus), with secondary emphasis on lagomorphs (Lepus and Sylvilagus) for both food and tools. Bison is probably also represented but in low numbers.

INTERPRETATIONS

John Gooding

The interpretations of the data from Sisyphus Shelter are limited by the small number of analogous sites within reasonable proximity and by the paucity of regional interpretations. On the other hand, the interpretive framework is supported by the wealth of cultural remains retrieved from the site and by the stratigraphic consistency of the deposits. The interpretations presented here are principally a result of comparisons of the cultural materials retrieved from the different levels of the site with the goal of understanding what changes occurred in the utilization of this rockshelter complex. The interpretations are discussed with respect to the DeBeque Rockshelter and the Kewclaw Site, excavated recently in the area. These interpretations attempt to determine the nature of typical cultural remains and the range of variation for the prehistoric occupations, given the constraints of the chronometric data derived from the three sites. The summation of the interpretations focuses on the role that the known archaeological data play in our current understanding of the regional interpretations of the prehistory. Of particular importance is the issue of how the data fit the currently accepted regional framework.

The most basic data derived from Sisyphus Shelter are the radiocarbon dates. All of the samples are from cultural deposits (see Figure 5). Some are from features and represent ages that closely approximate the prehistoric use of those features. Other dates were derived from charcoal not associated with specific features. Although these dated samples do not provide a specific cultural context, they perform an important function in determining the approximate age of the depositional levels from which they were extracted. At Sisyphus Shelter, this is an important consideration because, as Figure 5 demonstrates, the stratigraphic relationships of all of the radiocarbon samples are consistent with the derived dates, which suggest that the depositional patterns at the site were uniform. The dates also indicate that there was one deeply intrusive structure, Feature 9.

To aid interpretations, the dates and period/phase correlations of the northern Colorado Plateau are listed in Table 7. The table provides a basis for correlation with 1) the cultural occupations at Sisyphus Shelter, 2) the dates retrieved from the DeBeque Rockshelter and the Kewclaw Site, and

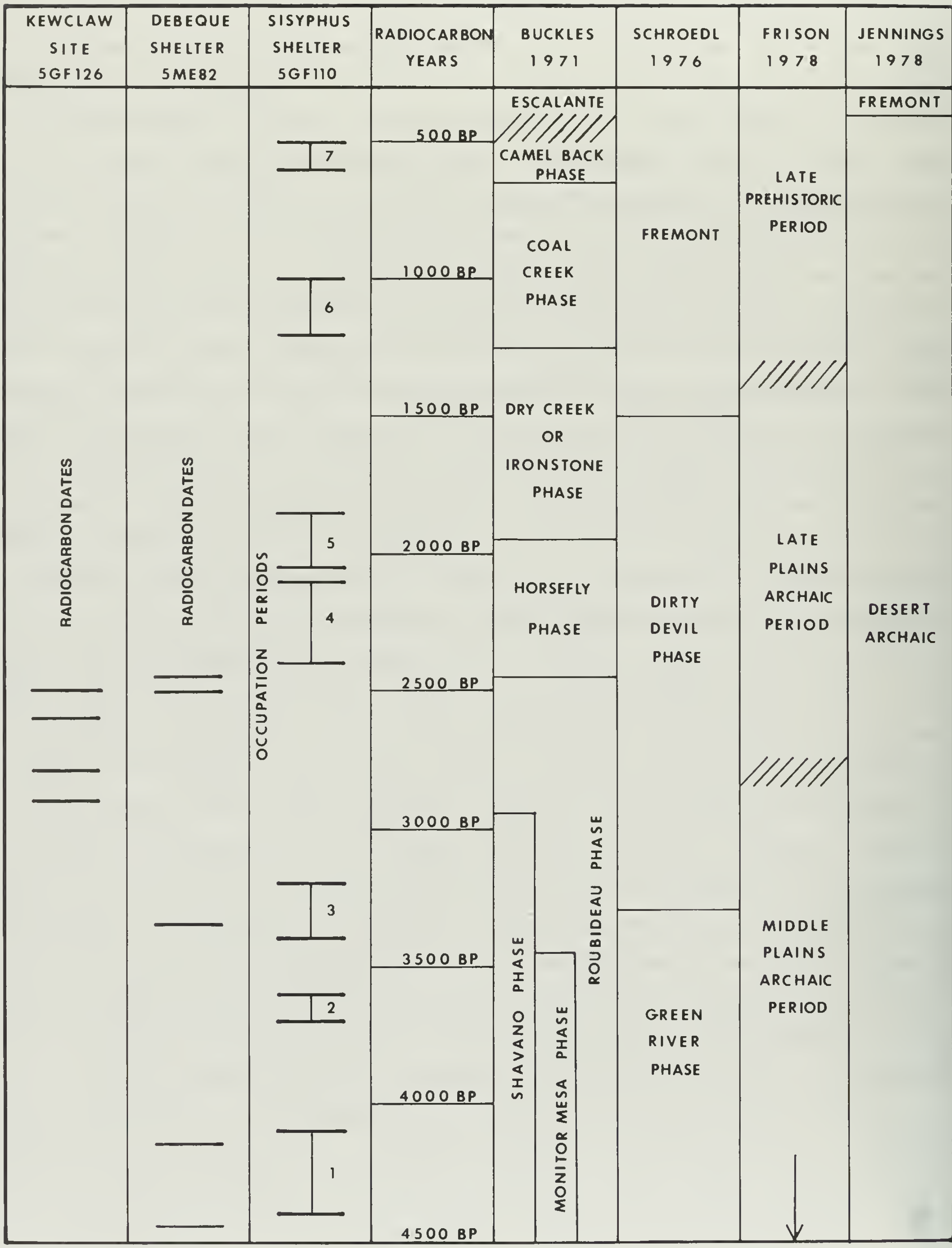


Table 7.
Site dates and period/phase correlation of the Northern Colorado Plateau.

3) data from previously developed phase and period chronologies. The table is used to interpret the Sisyphus Shelter chronology which dates from 4400 to 500 B.P. Dates greater than 4400 B.P. at the DeBeque Rockshelter and other sites are not relevant to the present discussion. The Sisyphus Shelter occupations have not been assigned to specific phases, although phase developments postulated by Buckles (1971) and Schroedl (1976) are referenced for comparative purposes.

It is hypothesized here that the occupation of Sisyphus Shelter occurred primarily during the winter months. It is important to note that the rockshelter is south-facing and is situated on the sandstone benches above the river bottom. Consequently, it is in the wind and storm shadow of the valley. This was particularly evident to the crew as excavation progressed through February, March and April. The summer months in this area are exceptionally hot and dry, precluding the need of the type of shelter discussed here, because it is not adequate to provide shade from the summer sun. Heat collection in the afternoon would make it unbearable as an occupation area. It is also important to note that this area of the Grand Valley is an established winter range for deer.

The site description suggests a definable pattern of usage within Area C. Specifically, the planview (see Figure 6) indicates a high correlation between placement of hearth features with relation to the dripline of the shelter. This is a matter of conjecture yet is evident from this figure. Presumably, there are physical determinants for this hearth/dripline relationship. The same holds true for Feature 9 (the habitation), which is half behind and half in front of the dripline. It is hypothesized that Feature 9 had a lean-to roof, resting against the upper face of the rockshelter at the dripline. The most important point with regard to hearth placement is that the relationship with the dripline did not change substantially through time. This hearth placement is such that occupants could have carried on daily activities in the shelter behind the fires, which would have created a heat shield, allowing normal domestic activities.

The interpretation of the material culture section suggests that the economic pursuits, utilizing the lithic technology, also did not change through time. This would suggest that these pursuits are limited in character, implying single season occupancy. The only variables that could be discerned are utilized material types discussed in detail by Dominguez,

Appendix III, this volume. Specifically, there is a shift in material types used during different paleoenvironmental episodes. These environmental shifts were not pronounced enough to change the basic technology of the exploitation pattern but seemed to have been sufficient to shift the boundaries of the area of exploitation around the site. It must be remembered that paleoenvionmental reconstruction is interpretive and because of local conditions, each site will likely have unique aspects in its paleoenvironmental history. The important point here is that between Sisyphus Shelter, the DeBeque Rockshelter and the Kewclaw Site, there are more similarities that differences.

Occupation Sequence

Dates of Occupation 1 at Sisyphus Shelter are correlated closely with two radiocarbon dates from the DeBeque Rockshelter (see Table 7). The temporal correlation of these sites shows, subregionally, that cultural assemblages were diverse and well developed (cf. Reed and Nickens 1980). This occupation at Sisyphus Shelter was preceded by occupations at several other sites in the area (see Appendix I).

There are no immediate correlations for the second occupation with either DeBeque or the Kewclaw Site. Other known dates from this time period were retrieved by Leach (1970) at Deluge Shelter and by C. Jennings (personal communication 1983) from Rio Blanco County (see Appendix I). These artifact assemblages do not suggest any significant changes in lifestyle or economic pursuits from Occupation 1. The fact that there was only one feature for Occupation 2 suggests that this was not occupied as intensely as other occupations at Sisyphus Shelter.

Occupation 3 is supported by a correlated date from DeBeque Rockshelter (see Table 7), suggesting a second identifiable occupation at the subregional level. Other dated sites that fall within this time frame are Sudden, Pint-Size and Deluge Shelters. The assumption one may draw from this is that this time period may be one in which there was extensive rockshelter occupation across a great deal of the Colorado Plateau.

The hiatus in occupations between 3200 and 2400 years ago at Sisyphus Shelter is important because into this gap fall all of the dates recovered from the Kewclaw site, which suggest a shift in occupation for the

subregion. Perhaps the shift was away from rockshelters and toward habitations in open areas. In the 2400 to 2500 year period, there are dates which have been retrieved from the DeBeque Rockshelter.

Occupation 4 saw the introduction of large-scale architecture, evidenced by the habitation, which represents a unique approach to rockshelter occupations. It is suggested here that at this time period there was an introduction of a more complex set of cultural elements and a shift toward a more sedentary lifeway. It is difficult at this time to say whether or not the combination of architecture and the rockshelter habitat are indicative of a shift in the habitation planning in the area, or if Feature 9 is a unique event.

In terms of nearby occupied sites, Occupation 5 does not appear to have any close associations. This occupation demonstrates a return to the previous rockshelter habitation strategy with a concomitant reduction in tool and material types from the high frequencies represented by Occupation 4.

Occupation 6 is reinforced by a large number of dates that fall within this time period within the surrounding four counties. It remains an open question of whether this occupation is actually a manifestation of the "Fremont" culture and what the latter's constituent characteristics are. This is the first occupation at Sisyphus Shelter that exhibited abundant faunal remains (see Appendix IV). Presumably, all earlier occupations left remains that decomposed entirely and could not be retrieved. The faunal list suggests a very wide range of mammals exploited by the inhabitants.

Occupation 7 falls into the same time period as other sites in Garfield and Rio Blanco Counties (see Appendix I). It is the last occupation represented at the site and may have "Fremont" associations. At this point in the stratigraphy, the rockshelter is filled very close to the ceiling and does not offer a great deal of maneuverable room behind the dripline. Consequently, it is believed that this last occupation is incidental. Many of the major elements essential for cultural interpretation are not represented in this occupation level.

With regard to the paleoenvironment, the occupations of Sisyphus Shelter were distributed through periods characterized as warm and dry and more mesic and cooler. Occupation 4, accompanied by the introduction of

large-scale architecture, is noted during a warm, dry episode, while the hiatus noted to precede Occupation 4 occurred during a period of climatic change from a mesic interval (Occupation 3) to the warmer, drier conditions of Occupation 4. Occupations 3, 5, 6 and 7 are all noted during periods that are characterized as more mesic and possibly cooler. With the exception of Occupation 6, these do not appear to have been intense periods of occupation at Sisyphus Shelter. The most intense periods of occupation correlated with warmer climatic conditions while intervals characterized as mesic and/or cooler are generally periods of limited occupation.

In order to review the seven occupations for the purpose of determining the scope of occupation at the rockshelter complex and to understand the duration of the various occupations, the data from Table 2 and the projectile point styles/levels illustrated in Figure 42 are examined. Of concern here is that the Pinto single shouldered point, the San Rafael side-notched fragment and the side-notched knife were retrieved from Area A. Even though Area A produced no radiocarbon dates for the earlier periods and since the projectile points retrieved are at least Middle Archaic period in age, it is apparent that the earlier occupations are not limited to Area C.

There was no firm evidence that Area B was used during the earlier occupations or that Areas A and B were used during occupation of the habitation (Occupation 4). However, given the complexity and size of the structure, it seems unlikely that these adjacent areas were not used in some fashion. Occupation 5 provides firm evidence of contemporaneous use of all three areas. One might assume from these data that Occupation 5 represented a larger population, or perhaps, more intense use during its occupation. Occupations 6 and 7 provide radiocarbon evidence that Areas A and C were utilized contemporaneously. Reflecting momentarily on the absence of earlier features and dates from Area A, the lack of such proofs of occupation could be a result of the shallowness of the deposits over bedrock and the possibility that remodeling occurred in Area A.

Site Comparisons

The data included in this report would suggest that, for the most part, Sisyphus Shelter is a typical rockshelter for the area. In attempting to

gain a better understanding of its characteristics, a brief review of similarities and differences of Sisyphus, Kewclaw and DeBeque Rockshelter is made here (see also Table 7). Reference has already been made to the radiocarbon associations.

First, both sites are within two-hour walking time to Sisyphus; Kewclaw is upstream and DeBeque is downstream. Thus, it is possible that communal relationships existed. By the same token, it is important to point out that other sites of equal size may be found within the boundaries of this corridor which may change the communal character. Furthermore, all three sites are within two kilometers of the Colorado River, but all are at least one kilometer away from it, and out of view from the river. This would suggest that occupants of the three sites utilized the habitat with a minimum of intrusion upon wintering deer populations and other riverine-adapted flora and fauna.

The site types are somewhat more variable, but overlap as well. The testing at DeBeque suggests that it is a rockshelter with hearth features scattered throughout. The Kewclaw site is an open site possessing a large architectural feature that has the characteristics of a habitation. Sisyphus is a rockshelter that at one level contains an architectural feature that is a habitation. It is not suggested that Sisyphus is an amalgamation of the other two sites, but is a demonstration of the possible ranges of variation for prehistoric occupations in this area.

The chronology of occupation illustrated in Table 7 suggests that rockshelters contain more evidence of reoccupation and longer temporal spans. This could simply be the result of exposure to the elements of open sites as opposed to rockshelters. It must be pointed out here that the radiocarbon dates from the Kewclaw Site represent a buried chronology and some evidence for reoccupation of the habitation.

All three of the sites yielded groundstone as well as an abundance of chipped stone that reflect a tool assemblage geared toward broad spectrum economic exploitation. A close scrutiny of projectile point types, which should be the hallmark of cultural identity for these occupations, shows that the diversity does not offer clear cut distinctions for cultural identification. It is important to point out that this is the same problem that Buckles (1971) encountered in attempting to develop a stylistic

typology for the Uncompahgre Complex. It appears that projectile point styles are of limited value for determining cultural and chronological application of prehistoric occupation in this area. It will be necessary for archaeologists to search for other cultural elements on which to base assumptions of cultural affiliation. Analysis of the entire tool assemblage to develop a firmer grasp of the technological and functional aspects of the flake tool industry may prove useful. Further, a more detailed scrutiny of lithic material types may also be useful in understanding inter-site relationships, such as trade networks. At this time, comparative lithic material analysis for the three sites has not been done.

Regional Implications

It is useful now to review the relationships of these sites within regional framework. Appendix I is a compiled list of 213 radiocarbon samples that are all known dates from Rio Blanco, Garfield, Mesa, Montrose and Ouray Counties in Colorado, and the principal dated rockshelters in Utah, which provide the framework for northern Colorado Plateau chronology. The graph shows, with the exception of a few hiatus points prior to 5500 years ago, that the sequence of dates derived from cultural material exhibits an extremely smooth curve representing increasingly dense occupation over the last 9000 years. The data in Appendix I suggest an unbroken, continuous occupation in western Colorado for at least 5000 years. Distinct phases are not apparent from the radiocarbon dates.

There is no evidence to suggest that the time period 8300 to 6200 B.P. constitutes a cultural unit such as the Black Knoll Phase as defined by Schroedl (1976:56-63). Within this time period based on these data, there are at least two date clusters and numerous small gaps, which probably reflect a lack of samples. It is important to point out that there is a hiatus between 5400 and 5900 B.P. This hiatus is evident at Vail Pass (Gooding 1981) and is also evident, though smaller, in the accumulated radiocarbon dates in the Curecanti area (Jones 1982). Approximately 5000 years ago, there begins an unbroken string of radiocarbon dates that runs to modern times. Consequently, phase distinctions based principally on chronometric data such as those postulated by Schroedl (1976) may be suspect. The phase sequence postulated by Buckles (1971) is based

principally on projectile point styles and presents some inherent problems. That sequence proved extremely difficult to use because of the simultaneous development of various phases that are not supported by enough chronometric data.

The Uncompahgre Technocomplex

Recent synthetic overviews of western Colorado (Grady 1983; Reed 1983) define the boundary between northwestern and west-central Colorado as the Colorado River trench. The placement of this group of sites (Sisyphus, Kewclaw and DeBeque) on the border of these two regions forces the question of which geocultural area best defines the occupations. The answer is both, but not on all points. There are two high-density areas in western Colorado, one on the Uncompahgre Plateau and the other in the Dinosaur/Canyon Pintado region. These three sites are in closer proximity to the Uncompahgre Plateau, leading one to suspect that a more appropriate boundary between northwest and west-central Colorado might be the divide between Roan and Piceance Creeks that separates the Colorado River drainage from the White and Yampa River drainages. This separation is based principally on site density, rather than on chronometric data or cultural material. This leads to the presumption that Sisyphus, Kewclaw and DeBeque are manifestations of the Uncompahgre Complex. While they do not fit neatly into the phase scheme of Buckles (1971), they do possess the typical characteristics outlined by Wormington and Lister (1956:78-89) in the original definition of the complex.

The argument for associations with the Uncompahgre Complex are strengthened when Toll's (1977:160) application of Clarke's (1968) terms "technocomplex" and "regional subculture" are considered. For the technocomplex, Toll's (1977:161-177) comparison of horticultural to non-horticultural subsistence practices in the Dolores River canyon and upland environments is of critical importance when compared to Grady's (1980:247) assertion that in the Piceance Basin "...we have an island of Archaic culture surrounded by Fremont culture." It is apparent that both authors are viewing the same phenomenon. Toll's polythetic interpretation presents a perceptive model that covers several possibilities regarding the interactions between different environments, if not between different

cultural groups. Toll's goal was to define site function based on minimum numbers of attributes (1977:45-49). There is some question as to whether or not survey data are sufficient to determine site function, but site function is undoubtedly the best gauge of Archaic stage or Formative stage economic patterns.

Toll's second applied term "regional subculture" (1977:160) is a concept that has been supported by subsequent arguments emanating from the Fremont/Sevier Symposium (Madsen ed. 1980), specifically, "...the scheme of culture classification that marks the present level of Fremont regional synthesis..." that is argued by Hogan and Sebastion (1980:16). They maintain that "...the variants as defined have only minimal validity..." (1980:16) and that "...it seems most profitable to drop back to concentrated studies of communities, exploring in detail, local systems of adaptation" (1980:16). The breakdown of local systems of adaptations that Toll (1977:170-173) provides, although somewhat extreme, furnishes a thorough basis for the defense of the postulation of a technocomplex.

A brief comparison of percentages of site attributes from the 1975 Dolores River survey indicates that 1) ceramics were a low percentage, 2) all Anasazi rockshelters constitute 35.8 percent of the sites, and 3) the percentage of architectural features, at 11.1 percent, is relatively consistent with the percentage of grinding tools at 16 percent (Toll 1977:44). In short, these data are reasonably consistent with the survey results of Buckles (1971) and Hibbets et al. (1979). Consequently, it seems most appropriate to assert that there is an Uncompahgre Technocomplex that is exemplified by "...a polythetic range of differing specific types and states from the common set of artifact-type [sic] families" (Clarke 1978:329). This is exemplified by the extremely wide variety of projectile point styles. Further, this technocomplex is centered geographically on the Uncompahgre Plateau, extending from the Dolores River and the San Juan Mountains on the south to possibly as far north as the Piceance Basin, and from the Gunnison gorge on the east, possibly as far west as the LaSal Mountains.

The Uncompahgre Technocomplex can be identified as a regional subculture that is "...semi-discrete but continuous branches of a single culture..." (Clarke 1978:252). This is exemplified by the radiocarbon data provided in

Appendix I and the range of variation that is identified in site types on and around the Uncompahgre Plateau. It is reasonable to accept the evidence that there is an identifiable cultural manifestation known as the "Desert Archaic" (Jennings and Norbeck 1955:1-11). It seems plausible that one of the "semi-discrete branches" of that culture could be a subalpine plateau variant that is most prominent in the area of the Uncompahgre Plateau.

Returning briefly to Jennings' interpretation of the Fremont, one is struck by the often used illustrations that appear in popular explanations of that cultural group, specifically Figures 141-143 (1978:157-159). Figure 141 illustrates Fremont regional variations which cover all of Utah except the extreme southern portion, yet Figure 142 is an illustration of Fremont ceramic core areas, and Figure 143 illustrates distribution of those ceramics outside the core areas. The difference in sizes of the areas encompassed between Figure 141 and Figures 142 and 143 is striking. The first conclusion one draws is that perhaps the Fremont culture is not as pervasive as demonstrated commonly, and that Grady's statement (1980:247) should be reversed to say, what we have are islands of Fremont in a sea of Archaic. Of course, it is naive to make rigid distinctions regarding whether a culture is Archaic stage or Formative stage without thorough support data of the entire socio-economic structure of the culture in question. In the case of the Fremont, it seems that the most applicable term for definition for much of the Fremont may be "Preformative," as defined by Willey and Phillips (1958:144-146). It is apparent that the Fremont variants are very widespread and the sporadic character of evidence of agriculture suggests strongly a state of "emerging" agriculture as described (Willey and Phillips 1958:145). This issue is extremely relevant to the original definition of the Uncompahgre Technocomplex. Wormington and Lister (1956:78-92) used an extensive trait list of comparative data in establishing the character of the complex. They compared Archaic stage components from the southwestern United States and as far north as Wyoming. Obviously, because of the multi-component nature of many of the sites referenced, there was unavoidable overlap with some of the Fremont assemblages. However, nowhere is there reference made to the Turner-Look site, which is near the defined Uncompahgre Complex and is an accepted Fremont variety site. Obviously, the similarities and differences between

the Uncompahgre Technocomplex and the Fremont culture need to be investigated more closely. It is believed here that most of the inferences regarding "Fremont" occupations are a result of a general confusion of Wormington's (1955) and Wormington and Lister's (1956) publications on the two distinct topics and the proximity of those areas of research.

Finally, a comparative review of Buckles' (1971) data, and the compiled radiocarbon dates in Appendix I in this volume, suggest that there is considerable time depth for the occupation of the Uncompahgre region. The subsistence patterns do not seem to have changed drastically (at one point there was a definite influx of Anasazi cultural traits) and the population seems to have been relatively stable, displaying a slight growth curve.

CONCLUSIONS AND OBSERVATIONS

John Gooding

Data for the excavation of Sisyphus Shelter suggest that there were as many as seven occupations of the suite of two shelters and the rock enclosure. At least one of the first three and the last three occupations utilized two of the three areas. The utilization of two or more areas at different times may suggest fluctuations in the human population at the site, but any estimates would be purely conjectural. Reviews of the literature on the prehistory of the northern Colorado Plateau indicate that the slab-lined habitation that was discovered in Level VII and constituted Occupation 4 is unique in the record. However, with other early habitations recently coming to light, such as the Kewclaw site, it is apparent that a re-evaluation of the data would be timely.

It is also sugggested here that projectile point stylistic typology is not an adequate basis for the postulation of a phase sequence, because of the extreme variability in projectile point styles recovered from the Uncompahgre Plateau area. The distinctive characteristics, however, may be contained in the chipped stone assemblage from Sisyphus Shelter. The most obvious characteristic is that there are changes in volume of chipped stone tools in the various levels at Sisyphus that can be equated with the occupations. To some extent, they reflect the variation of population size during the Sisyphus occupations. The analysis of the chipped stone tools addresses the question of cultural identification where Buckles (1971:1178-1179) takes issue with the assertion of Wormington and Lister (1956:78-89) that the Uncompahgre scrapers are diagnostic of the complex. The data from Sisyphus Shelter suggest that these tools are diagnostic of the Uncompahgre Technocomplex in that they reflect a pervasive retouch flake technology basic to the chipped stone tool assemblage. It is postulated here that this technology can be distinguished locally from the biface reduction technology identified by Indeck and Kihm (n.d.). Further, this is a circumstance where cultural distinctions cannot be made on the basis of projectile points alone.

The evidence presented here also provides a different perspective on the archaeological record from a regional point of view. Heretofore, the valley of the Colorado River has been considered as a subregional boundary. The

number and especially the sizes of the sites investigated recently indicate that this riverine corridor is definitely not a boundary, but a consistently inhabited and exploited environment. The comparative data retrieved from the sites in the area suggest strongly that these sites are an extension of the Uncompahgre Technocomplex. This technocomplex has been defined previously as a subregional subculture (Toll 1977) that can be defined further as a subalpine variant of the "Desert Archaic" (Jennings and Norbeck 1955).

It is asserted here that there are serious theoretical problems in understanding the prehistory of the northern Colorado Plateau that stem principally from confusion regarding the definiton and application of the terms "Archaic" and "Formative." This issue extends significantly beyond the scope of this monograph. Until these definitions have been defined more clearly for west-central Colorado, it is best to interpret Sisyphus Shelter as part of the Uncompahgre Technocomplex. Its inclusion in the technocomplex emphasizes cultural development within a specific geographic location.

The Uncompahgre Technocomplex is a refined definition of the original trait list approach of Wormington and Lister (1956) and is supported by the data generated in five subsequent surveys (Buckles 1971; Toll 1977; Martin 1977; Hibbets et al. 1979; Grady 1980). The Uncompahgre Technocomplex does not bear any specific relation to the temporal developments postulated by Schroedl (1976), or to the hypotheses of abandonment and reoccupation of the northeastern Great Basin (Madsen and Berry 1975:391-405). The radiocarbon data presented for Sisyphus Shelter, DeBeque Rockshelter and the Kewclaw Site do not support Buckles' (1971) phase sequence for the Uncompahgre Complex.

Continued investigations of west-central Colorado may benefit from an application of Toll's (1977) expanded polythetic approach and from a thorough investigation of the regional stone tool technologies. In conjunction with dated sites and features, this approach would provide the most useful basis for understanding the chronology and diachronic variability in regional settlement patterns and a comparative basis for investigation of unique, regional characteristics.

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APPENDIX I

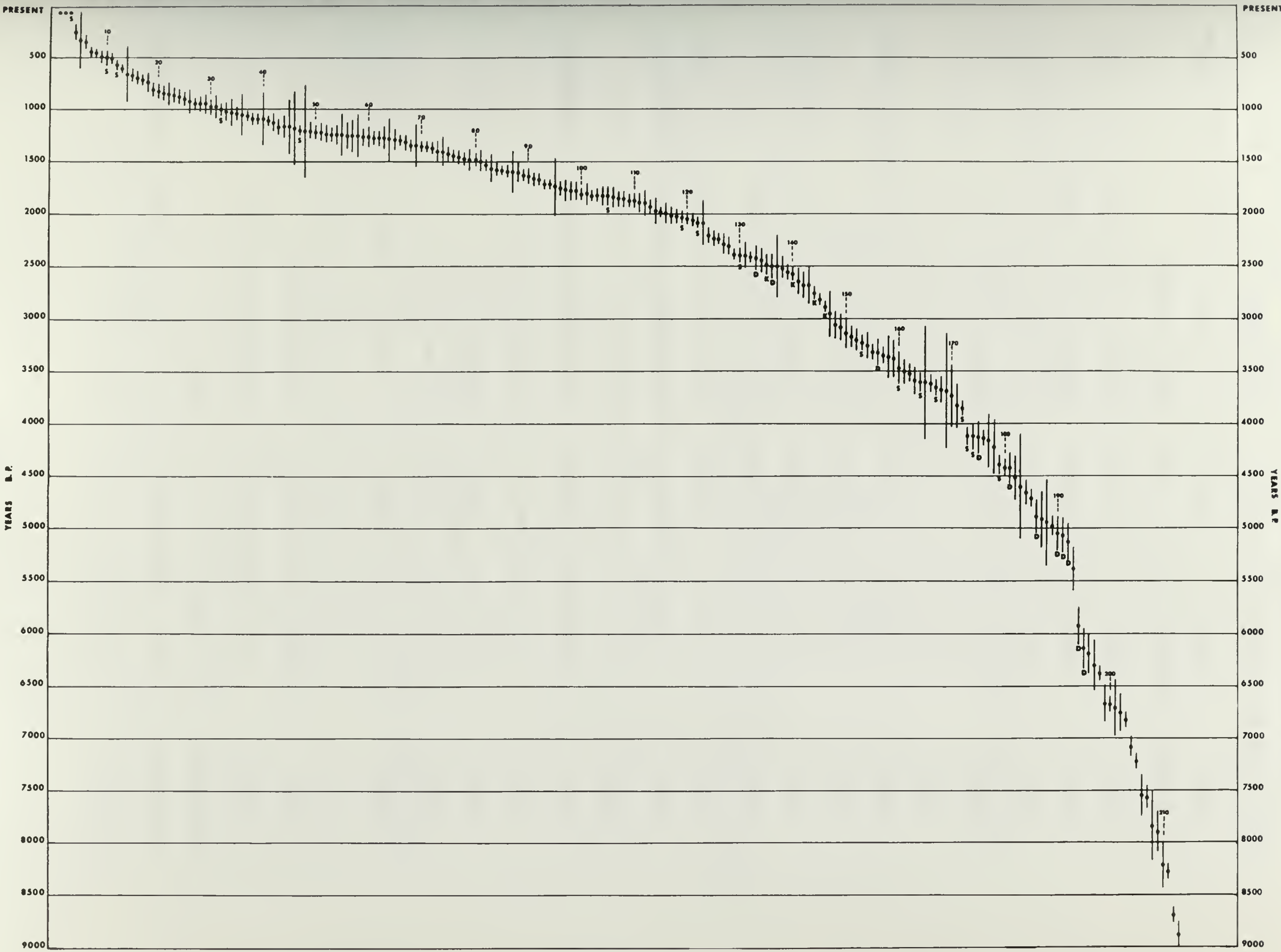
RADIOCARBON DATA FROM THE NORTHERN COLORADO PLATEAU

By
Andrea Barnes

Radiocarbon samples were compiled from sites on the northern Colorado Plateau. As depicted in Figure 44, dates show a fairly continuous occupation of the area from 9000 B.P. to the present, with increasing intensity from 5000 B.P. There are slight breaks in occupation from 5400 to 5900 B.P. and from 3800 to 4200 B.P., as indicated in the graph. These breaks, however, may indicate a lack of samples rather than abandonment of the area.

The graph is divided arbitrarily into groups of ten dates for cross referencing the index following the chart. Comparison of the radiocarbon dates from two sites in the immediate area of Sisyphus Shelter are indicated on the graph. These sites are the DeBeque Rockshelter (5ME82), indicated by the letter "D," and the Kewclaw site (5GF126), designated by the letter "K." Sisyphus Shelter (5GF110) is shown by the letter "S."

Radiocarbon chronology of the Northern Colorado Plateau.



RADIOCARBON CHRONOLOGY INDEX OF THE NORTHERN COLORADO PLATEAU

Site No./Name	Date B.P.	Lab No.	Reference
1. 5GF128	Modern	BETA-3838	C. Conner, personal communication
2. Gilbert	Modern	GaK-1305	Shields 1967
3. 5GF110	Modern	DIC-1656	Gooding and Shields, this volume
4. 5RB699	265 ± 75	UGa-3388	LaPoint et al. 1981
5. 5GF130	340 ± 270	DIC-2184	C. Conner, personal communication
6. 5RB699	355 ± 65	UGa-2426	Creasman 1981
7. 5RB699	460 ± 60	UGa-3381	LaPoint et al. 1981
8. 5ME901	470 ± 45	DIC-2122	C. Conner, personal communication
9. 5OR182	510 ± 60	BETA-1971	Buckles ed. 1981
10. 5GF110	520 ± 55	DIC-1657	Gooding and Shields, this volume
11. 5RB748	520 ± 75	UGa-3377	LaPoint et al. 1981
12. 5GF110	580 ± 55	DIC-1658	Gooding and Shields, this volume
13. 5GF134	620 ± 45	DIC-2276	C. Conner, personal communication
14. 5RB804	670 ± 270	UGa-3378	LaPoint et al. 1981
15. 5GF134	680 ± 65	DIC-2275	C. Conner, personal communication
16. 5RB817	705 ± 60	UGa-2496	Gordon et al. 1979
17. 5RB699	725 ± 60	UGa-2422	Creasman 1981
18. 5RB699	740 ± 85	UGa-2423	Creasman 1981
19. 5GF134	820 ± 70	BETA-3576	C. Conner, personal communication
20. 5GF134	830 ± 70	BETA-3573	C. Conner, personal communication
21. 5RB699	850 ± 65	UGa-2421	Creasman 1981
22. 5ME429	860 ± 110	RL-1170	Martin et al. 1980
23. 5MN368	870 ± 70	UGa-1274	Crane 1978
24. 5RB2210	880 ± 70	BETA-3648	C. Conner, personal communication
25. 5MN654	905 ± 65	UGa-1379	Crane 1978

26.	5ME428	930 ± 120	RL-1173	Martin et al. 1980
27.	5RB2025	950 ± 55	DIC-2185	C. Conner, personal communication
28.	5RB748	950 ± 70	UGa-3377	LaPoint et al. 1981
29.	5GF134	950 ± 80	BETA-3574	C. Conner, personal communication
30.	5OR198	980 ± 60	BETA-1969	Buckles ed. 1981
31.	Windy Ridge Village	980 ± 110	RL-60	Madsen 1975
32.	5GF110	1010 ± 55	DIC-1662	Gooding and Shields, this volume
33.	Deluge Shelter	1030 ± 85	GX-0894	Leach 1970
34.	Power Pole Knoll	1040 ± 130	RL-62	Madsen 1975
35.	5MN367	1045 ± 60	--	Crane 1977
36.	Poplar Knob	1060 ± 200	M-552	Marwitt and Fry 1973
37.	5RB1873	1070 ± 50	DIC-2264	C. Jennings, personal communication
38.	Whiterocks Village	1090 ± 60	GX-0902	Shields 1967
39.	5ME3969	1100 ± 50	BETA-3985	C. Conner, personal communication
40.	5ME0	1100 ± 250	W-190	Rubin and Seuss 1955
41.	5RB699	1120 ± 50	W-4250	Creasman 1981
42.	Whiterocks Village	1130 ± 80	GaK-1306	Shields 1967
43.	5GF129	1170 ± 75	DIC-2177	C. Conner, personal communication
44.	Crescent Ridge	1170 ± 100	RL-61	Madsen 1975
45.	Old Woman	1170 ± 250	M-551	Marwitt and Fry 1973
46.	5MN517	1190 ± 355	UGa-1132	Crane 1978
47.	5GF110	1210 ± 50	DIC-1663	Gooding and Shields, this volume
48.	5GF134	1210 ± 410/440	DIC-2183	C. Conner, personal communication

49.	Deluge Shelter	1215 ± 85	GX-0895	Leach 1970
50.	5RB699	1220 ± 65	UGa-3385	LaPoint et al. 1981
51.	5RB699	1225 ± 85	UGa-1920	Creasman 1981
52.	Goodrich	1240 ± 85	GX-0826	Shields 1967
53.	5OR198	1250 ± 70	BETA-2455	Buckles ed. 1981
54.	5GF134	1250 ± 90	BETA-3575	C. Conner, personal communication
55.	5RB0	1250 ± 200	W-4196	C. Jennings, personal communication
56.	Windy Ridge Village	1260 ± 120	RL-59	Madsen 1975
57.	Mantles Cave	1260 ± 150	RL-11	Adovasio 1970
58.	5RB0	1260 ± 200	W-4194	C. Jennings, personal communication
59.	5GF134	1270 ± 80	BETA-3571	C. Conner, personal communication
60.	Goodrich	1270 ± 95	GX-0910	Shields 1967
61.	Gilbert	1280 ± 60	GX-0825	Shields 1967
62.	5RB699	1280 ± 70	UGa-3380	LaPoint et al. 1981
63.	5ME429	1280 ± 110	RL-1169	Martin et al. 1980
64.	5RB690	1285 ± 200	UGa-2166	Kranzush 1979
65.	Gooseberry	1290 ± 100	--	E. DeBloois, personal communication in Lindsay and Lund 1976
66.	5RB726	1300 ± 50	W-4249	Creasman 1981
67.	5GF134	1320 ± 70	BETA-3572	Carl Conner, personal communication
68.	5RB804	1350 ± 60	UGa-3379	LaPoint et al. 1981
69.	5ME0	1350 ± 200	L-167	Broeker et al. 1956
70.	5GF128	1360 ± 50	DIC-2179	C. Conner, personal communication
71.	5MN653	1370 ± 65	UGa-1375	Crane 1978
72.	5RB707	1375 ± 60	UGa-1924	Creasman et al. 1977
73.	Joe's Valley Alcove	1410 ± 100	--	E. DeBloois, personal communication in Lindsay and Lund 1976

74.	5RB363	1410 ± 140	UGa-1497	Creasman et al. 1977
75.	Caldwell Village	1430 ± 70	GX-0357	Ambler 1966
76.	5RB715	1450 ± 60	UGa-1923	Creasman et al. 1977
77.	5RB699	1470 ± 70	UGa-3387	LaPoint et al. 1981
78.	5GF128	1480 ± 60	BETA-4060	C. Conner, personal communication
79.	Clyde's Cavern	1490 ± 100	RL-175	Winter and Wylie 1974
80.	Cowboy Cave	1495 ± 60	SI-2425	Jennings 1980
81.	Snake Rock	1505 ± 95	GX-0358	Aikens 1967
82.	5ME217	1540 ± 55	DIC-974	Lutz 1978
83.	5RB123	1575 ± 135	UGa-1045	C. Jennings in preparation
84.	Cowboy Cave	1580 ± 60	SI-2426	Jennings 1980
85.	5ME217	1590 ± 50	DIC-972	Lutz 1978
86.	5GF128	1610 ± 60	BETA-3837	C. Conner, personal communication
87.	5RB123	1620 ± 195	UGa-1046	C. Jennings in preparation
88.	Deluge Shelter	1625 ± 95	GX-0896	Leach 1970
89.	5RB699	1650 ± 60	UGa-3383	LaPoint et al. 1981
90.	5GF122	1660 ± 75	DIC-2182	C. Conner, personal communication
91.	5OR243	1680 ± 60	BETA-2456	Buckles ed. 1981
92.	5ME217	1690 ± 55	DIC-973	Lutz 1978
93.	5OR198	1730 ± 50	BETA-2641	Buckles ed. 1981
94.	5RB699	1740 ± 50	W-4248	Creasman 1981
95.	5RB726	1760 ± 275	UGa-2424	Creasman 1981
96.	5RB715	1775 ± 65	UGa-1921	Creasman et al. 1977
97.	Pint-Size Shelter	1790 ± 100	RL-534	Lindsay and Lund 1976
98.	5GF127	1800 ± 80	DIC-2180	C. Conner, personal communication

99.	5OR179	1800 ± 80	BETA-2636	Buckles ed. 1981
100.	5RB699	1825 ± 60	UGa-3384	LaPoint et al. 1981
101.	5RB704	1825 ± 100	UGa-1922	Creasman et al. 1977
102.	5OR179	1840 ± 50	BETA-2637	Buckles ed. 1981
103.	Cowboy Cave	1840 ± 65	SI-2423	Jennings 1980
104.	5RB699	1845 ± 90	UGa-2425	Creasman 1981
105.	5GF110	1850 ± 95	DIC-1805	Gooding and Shields, this volume
106.	5OR182	1860 ± 90	BETA-2151	Buckles ed. 1981
107.	5OR182	1870 ± 70	BETA-2639	Buckles ed. 1981
108.	5RB363	1875 ± 75	UGa-1495	Creasman et al. 1977
109.	Cowboy Cave	1890 ± 65	UGa-1053	Jennings 1975
110.	5RB699	1895 ± 70	UGa-3382	LaPoint et al. 1981
111.	5OR182	1910 ± 90	BETA-2640	Buckles ed. 1981
112.	5ME428	1910 ± 120	RL-1171	Martin et al. 1980
113.	5RB2212	1950 ± 70	BETA-3649	C. Conner, personal communication
114.	5ME428	1980 ± 120	RL-1172	Martin et al. 1980
115.	5OR243	2000 ± 50	BETA-2643	Buckles ed. 1981
116.	5OR179	2010 ± 100	BETA-1968	Buckles ed. 1981
117.	5OR182	2030 ± 80	BETA-2638	Buckles ed. 1981
118.	5RB1872	2040 ± 75	DIC-2263	C. Jennings, personal communication
119.	5GF110	2050 ± 65	DIC-1661	Gooding and Shields, this volume
120.	5OR243	2060 ± 60	BETA-1970	Buckles ed. 1981
121.	Cowboy Cave	2075 ± 70	SI-2422	Jennings 1980
122.	5GF110	2100 ± 55	DIC-1798	Gooding and Shields, this volume
123.	5MN40	2100 ± 220	ISO-820	Buckles 1971
124.	5OR243	2220 ± 80	BETA-2644	Buckles ed. 1981

125.	5ME217	2250 ± 75	DIC-971	Lutz 1978
126.	5RB699	2255 ± 55	UGa-3386	LaPoint et al. 1981
127.	5OR179	2300 ± 100	BETA-2635	Buckles ed. 1981
128.	5OR167	2320 ± 90	BETA-2454	Buckles ed. 1981
129.	5GF128	2400 ± 60	BETA-4061	C. Conner, personal communication
130.	5GF110	2410 ± 70	DIC-1660	Gooding and Shields, this volume
131.	Joe's Valley Alcove	2410 ± 130	--	E. DeBloois, personal communication in Lindsay and Lund 1976
132.	5RB1872	2430 ± 55	DIC-2262	C. Jennings, personal communication
133.	5ME82	2440 ± 120	RL-1222	Reed and Nickens 1980
134.	Joe's Valley Alcove	2460 ± 120	--	E. DeBloois, personal communication in Lindsay and Lund 1976
135.	5GF126	2500 ± 100	DIC-2181	C. Conner, personal communication
136.	5ME82	2510 ± 120	RL-1218	Reed and Nickens 1980
137.	5RB298	2515 ± 330	UGa-1702	Jones 1978
138.	5GF129	2530 ± 105	DIC-2178	C. Conner, personal communication
139.	5RB363	2570 ± 80	UGa-1496	Creasman et al. 1977
140.	5GF126	2590 ± 70	BETA-3841	C. Conner, personal communication
141.	5ME635	2660 ± 130	RL-1132	Alexander and Martin 1980
142.	5ME635	2690 ± 120	RL-1130	Alexander and Martin 1980
143.	5MN40	2695 ± 180	ISO-820	Buckles 1971
144.	5GF126	2770 ± 60	BETA-3840	C. Conner, personal communication
145.	5OR243	2830 ± 60	BETA-2642	Buckles ed. 1981
146.	5GF126	2900 ± 60	BETA-3839	C. Conner, personal communication
147.	5ME635	2970 ± 220	RL-1131	Alexander and Martin 1980
148.	Clyde's Cavern	3070 ± 130	RL-131	Winter and Wylie 1974
149.	5OR167	3090 ± 130	BETA-2000	Buckles ed. 1981

150.	5RB148	3150 ± 150	RL-0	C. Conner, personal communication
151.	5OR167	3180 ± 100	BETA-1999	Buckles ed. 1981
152.	5OR167	3215 ± 110	BETA-1998	Buckles ed. 1981
153.	5GF110	3240 ± 75	DIC-1698	Gooding and Shields, this volume
154.	Deluge Shelter	3260 ± 120	GX-0897	Leach 1970
155.	Cowboy Cave	3330 ± 80	SI-2495	Jennings 1980
156.	5ME82	3340 ± 130	RL-1215	Reed and Nickens 1980
157.	Sudden Shelter	3360 ± 85	UGa-905	Jennings et al. 1980
158.	Sudden Shelter	3375 ± 200	UGa-905a	Jennings et al. 1980
159.	Pint-Size Shelter	3390 ± 170	RL-536	Lindsay and Lund 1976
160.	5GF110	3480 ± 160	DIC-1801	Gooding and Shields, this volume
161.	Joe's Valley Alcove	3520 ± 120	--	E. DeBloois, personal communication in Lindsay and Lund 1976
162.	Sudden Shelter	3535 ± 95	UGa-1260	Jennings et al. 1980
163.	5RB312	3600 ± 130	RL-777	C. Jennings, personal communication
164.	5GF110	3620 ± 95	DIC-1772	Gooding and Shields, this volume
165.	5RB298	3620 ± 540	UGa-1704	Jones 1978
166.	Deluge Shelter	3630 ± 85	GX-0899	Leach 1970
167.	5GF110	3660 ± 80	DIC-1799	Gooding and Shields, this volume
168.	5RB312	3690 ± 130	RL-776	C. Jennings, personal communication
169.	5RB428	3700 ± 550	--	Stevens 1981
170.	5RBO	3750 ± 300	W-4192	C. Jennings, personal communication
171.	Deluge Shelter	3840 ± 210	GX-0898	Leach 1970

172.	5GF110	3870 ± 80	DIC-1800	Gooding and Shields, this volume
173.	5GF110	4130 ± 85	DIC-1804	Gooding and Shields, this volume
174.	5GF110	4130 ± 125	DIC-1803	Gooding and Shields, this volume
175.	5ME82	4140 ± 150	RL-1213	Reed and Nickens 1980
176.	5OR317	4145 ± 90	BETA-2152	Buckles ed. 1981
177.	Thorne Cave	4170 ± 250	W-1359	Day 1964
178.	Thorne Cave	4230 ± 250	M-783	Day 1964
179.	5GF110	4400 ± 95	DIC-1773	Gooding and Shields, this volume
180.	Sudden Shelter	4425 ± 85	UGa-904	Jennings et al. 1980
181.	5ME82	4430 ± 150	RL-1217	Reed and Nickens 1980
182.	Pint-Size Shelter	4520 ± 210	RL-535	Lindsay and Lund 1976
183.	5RB298	4605 ± 500	UGa-1716	Jones 1978
184.	Sudden Shelter	4670 ± 140	RL-475	Jennings et al. 1980
185.	5RB670	4720 ± 90	W-4244	Creasman 1981
186.	5ME82	4890 ± 160	RL-1214	Reed and Nickens 1980
187.	5OR167	4920 ± 270	BETA-2001	Buckles ed. 1981
188.	5RB298	4945 ± 415	UGa-1705	Jones 1978
189.	Sudden Shelter	4980 ± 90	UGa-1261	Jennings et al. 1980
190.	5ME82	5050 ± 160	RL-1216	Reed and Nickens 1980
191.	5ME82	5070 ± 160	RL-1219	Reed and Nickens 1980
192.	5ME82	5130 ± 170	RL-1220	Reed and Nickens 1980
193.	5RB1008	5390 ± 210	RL-1147	C. Jennings, personal communication
194.	5ME82	5930 ± 180	RL-1223	Reed and Nickens 1980
195.	5ME82	6150 ± 190	RL-1221	Reed and Nickens 1980

196.	Joe's Valley Alcove	6200 ± 190	--	E. DeBloois, personal communication in Lindway and Lund 1976
197.	Sudden Shelter	6310 ± 240	UGa-906	Jennings et al. 1980
198.	Cowboy Cave	6390 ± 70	SI-2421	Jennings 1980
199.	Sudden Shelter	6670 ± 180	RL-422	Jennings et al. 1980
200.	Cowboy Cave	6675 ± 75	SI-2420	Jennings 1980
201.	5OR167	6710 ± 270	BETA-2002	Buckles ed. 1981
202.	Joe's Valley Alcove	6760 ± 180	--	E. DeBloois, personal communication in Schroedl 1976
203.	Cowboy Cave	6830 ± 80	UGa-637	Jennings 1975
204.	Sudden Shelter	7090 ± 85	UGa-859	Jennings et al. 1980
205.	Cowboy Cave	7215 ± 75	SI-2419	Jennings 1980
206.	5RB298	7545 ± 205	UGa-1698	Jones 1978
207.	Sudden Shelter	7565 ± 115	UGa-903	Jennings et al. 1980
208.	Sudden Shelter	7840 ± 330	RL-474	Jennings et al. 1980
209.	Sudden Shelter	7900 + 190	RL-476	Jennings et al. 1980
210.	Joe's Valley Alcove	8210 ± 220	--	E. DeBloois, personal communication in Schroedl 1976
211.	Cowboy Cave	8275 ± 80	SI-2418	Jennings 1980
212.	Cowboy Cave	8690 ± 75	SI-2417	Jennings 1980
213.	Walters Cave	8875 ± 125	SI-2416	Jennings 1980

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APPENDIX II

POLLEN ANALYSIS AT SISYPHUS SHELTER, 5GF110, IN WESTERN COLORADO

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INTRODUCTION

Palynological analysis at the Sisyphus Rockshelter (5GF110) was undertaken in conjunction with archaeological mitigation of the site in preparation for widening highway I-70. The rockshelter is formed by a large boulder protruding from the ground, the occupied area being on the downhill side of the boulder. Pollen analysis of several stratigraphic columns overlapping in age was undertaken to define paleoenvironmental change in the vicinity of 5GF110, Sisyphus Shelter. Several stratigraphic columns were sampled because the floor of the rockshelter sloped severely; thus a complete sampling of all levels for paleoenvironmental interpretation could not be obtained from a single column. This rockshelter contains evidence of occupation dating between 4400 and 520 B.P., and is located at an elevation of approximately 5200 feet, one mile northwest of the Colorado River in Garfield County. The vegetation in the immediate vicinity of the site consists of Juniperus (juniper), Graminae (grasses), Atriplex (spiny saltbush), and Artemisia (sagebrush). Sarcobatus (greasewood) and Opuntia (prickly pear) are also noted in the vicinity of the site. A riparian habitat is found approximately one mile southeast of the site on the banks of the Colorado River.

In addition to stratigraphic sampling, several groundstone fragments were sampled in an effort to provide subsistence data relating to the occupation of the site. These groundstone tools, primarily manos, were washed with distilled water for the purpose of obtaining pollen data from plant remains that may have been ground. In addition, it was hoped that microscopic plant fibers would also be obtained in the wash to provide further data concerning the utilization of the tools. The potential applicability of fiber studies to archaeology is discussed by Seward (1983).

METHODS

Pollen was extracted from soil samples submitted by the Highway Department. A chemical preparation based on flotation was selected for removal of the pollen from the large volume of sand, silt, and clay with which they were mixed.

Hydrochloric acid (10 percent) was used to remove calcium carbonates present in the soil, after which the samples were screened through 150 micron mesh. Zinc bromide (density 2.0) was used for the flotation process. All samples received a short (5 minute) treatment in hot hydrofluoric acid to remove any remaining inorganic particles. The samples were then acetolated for three minutes to remove any extraneous organic matter.

Pollen washes from groundstone artifacts were taken using distilled water and dilute hydrochloric acid (10 percent HCl). A sterilized brush was used to scrub the ground surface to release the pollen and fibers adhering to it. The samples were then processed as described above.

Pollen was identified using a light microscope to count the pollen to a total of 200 grains per sample at a magnification of 430x. Pollen preservation in these samples varied from fair to excellent. Comparative reference material collected at the Intermountain Herbarium at Utah State University and the Universtiy of Colorado Herbarium was used to identify the pollen to the family, genus, and species level, where possible.

DISCUSSION

Paleoenvironment

Four stratigraphic columns were sampled for pollen in an effort to determine the paleoenvironmental history of the site (Table 8). These columns were all taken within Area C of the Sisyphus Shelter (5GF110). Column A was taken near the back wall underneath the overhang. This column contains only Strata VII and VIII from the upper portion of the stratigraphy. Column B was taken along the back wall where it comes closer to the dripline, and contained Strata III, IV, VII, VIII, and IX. Column C was taken at the dripline of the overhang in Area C. The column was removed from beneath a boulder, and therefore represents primarily the earlier deposits in the shelter, including Strata II, III, IV, and VII. Column D was taken in the extreme southwest portion of Area C in an area not sheltered by the overhang. Several of the strata are missing from this column, but those present include Strata II, IV, VIII, IX, and X. Stratum IV is considerably thicker in Column D than in other areas sampled for pollen.

Table 8.
Provenience of stratigraphic pollen samples from Sisyphus Shelter.

Pollen Sample No.	Stratum	Depth in cm below pgs	Pollen Counted	Soil Type	Radiocarbon Dates and Comments
<u>Column A</u>					
1	VII	85-90	300	Sandy clay	2410 ± 70 BP Feature 9
2	VII	80-85	200	Sandy clay	
3	VII	75-80	200	Sandy clay	
4	VII	70-75	300	Sandy clay	
5	VII	65-70	400	Sandy clay	
6	VII	60-65	300	Sandy clay	
7	VIII	55-60	300	Clayey sand	2050-2100 BP
8	VIII	50-55	200	Clayey sand	1010-1210 BP
9	VIII	45-50	300	Clayey sand	1010-1210 BP
10	VIII	40-45	400	Clayey sand	520-580 BP
<u>Column B</u>					
1	III	115-120	300	Sandy clay	3620-4130 BP
2	III	110-115	200	Sandy clay	3620-4130 BP
3	III	105-110	300	Sandy clay	3620-4130 BP
4	III/IV	100-105	200	Clay	
5	IV	95-100	200	Clay	
6	IV	90-95	200	Clay	3240-3480 BP
7	IV	85-90	200	Clay	3240-3480 BP
8	IV	80-85	200	Clay	3240-3480 BP
9	IV/VII	75-80	300	Sandy clay	2410 ± 70 BP Feature 9
10	VII	70-75	200	Sandy clay	2410 ± 70 BP Feature 9
11	VII	65-70	300	Sandy clay	2410 ± 70 BP Feature 9
12	VII	60-65	300	Sandy clay	2410 ± 70 BP Feature 9
13	VII	55-60	300	Sandy clay	
14	VII	50-55	300	Sandy clay	
15	VII	45-50	300	Sandy clay	
16	VII	40-45	300	Sandy clay	
18	VIII	30-35	200	Sandy silty clay	2100-2050 BP
19	VIII	25-30	200	Sandy silty clay	1010-1210 BP
20	VIII	20-25	200	Sandy silty clay	1010-1210 BP
21	VIII	15-20	200	Sandy silty clay	520-580 BP
22	IX	10-15	200	Clayey sand	
23	IX	5-10	300	Clayey sand	

Table 8, continued

Pollen Sample No.	Stratum	Depth in cm below datum	Pollen Counted	Soil Type	Radiocarbon Dates and Comments
<u>Column C</u>					
1	II	205-210	200	Clay	
2	II	200-205	200	Sandy silty clay	
3	II	195-200	300	Sandy silty clay	
4	II	190-195	200	Clay	
5	II	185-190	100	Clay	
6	II	180-185	200	Sandy clay	
7	III	175-180	200	Sandy clay	4400 ± 95 BP
8	III	170-175	200	Sandy clay	3620-4130 BP
9	III	165-170	100	Sandy clay	3620-4130 BP
10	III	160-165	200	Sandy clay	3620-4130 BP
11	IV	155-160	200	Sandy clay	3240-3480 BP
12	IV	150-155	100	Sandy clay	3240-3480 BP
13	IV	145-150	200	Sandy clay	3240-3480 BP
14	IV	140-145	100	Sandy silt	3240-3480 BP
15	VII	135-140	100	Sandy silt	
16	VII	130-135	200	Sandy silt	
<u>Column D</u>					
1	II	115-120	100	Mudstone	
2	II	110-115	100	Mudstone	
3	II	105-110	200	Mudstone	
4	IV	100-105	200	Clay	
5	IV	95-100	100	Clay	
6	IV	90-95	200	Clay	
7	IV	85-90	200	Clay	
8	IV	80-85	200	Clay	
9	IV	75-80	200	Clay	
10	IV	70-75	200	Clay	
11	IV	65-70	Insuff	Clay	
12	IV	60-65	100	Clay	
13	VIII	55-60	200	Clayey sand	
14	IX	50-55	200	Clay w/ very fine sand	
15	IX	45-50	200	Clay w/ very fine sand	
16	IX	40-45	200	Clay w/ very fine sand	
17	X	35-40	200	Sandy clay	
18	X	30-35	200	Sandy clay	
19	X	25-30	200	Sandy clay	

Paleoenvironmental interpretations from this rockshelter will, of necessity, be based on a combined stratigraphy produced by looking at Columns A, B, and C. The pollen records from these three columns are in agreement with one another in the strata in which they overlap. The more random fluctuation of pollen within Column D appears to be the result of different deposition and erosion patterns acting on the sediments not directly protected by the overhang. In general, the pollen preservation was worse in Column D than in the other three columns.

Several large blocks of sandstone, which have separated from the upper portion of the overhang, have acted to prevent erosion and facilitated accumulation of sediments within Area C. Mudstone and sandstone layers alternate in the Molina Member of the Wasatch Formation, producing overhangs which tend to be small and shallow through erosion of the soft mudstone. The more resistant sandstone then remains, forming the overhang.

The lowest stratum sampled for pollen is Stratum II, which is described as a transition zone between the mudstone and the overlying deposits. Stratum II is older than 4400 B.P., as defined by the oldest radiocarbon date obtained from the interface between Strata II and III. Stratum III is a sandy silt containing heavy caliche deposition on pebbles and artifacts. This cultural stratum occurs within the lower portion of Stratum IV and has produced radiocarbon dates of 3620 to 4130 B.P. (Gooding, personal communication, September 1983). Stratum IV is the lowest major cultural layer within Area C. Radiocarbon dates ranging from 4400 ± 95 B.P. to 3240 ± 75 B.P. were produced in this stratum. Strata V and VI are not represented in any of the pollen columns in this project. They are found primarily in the back of the shelter and neither strata contained much cultural material.

Feature 9, a slab-lined habitation extending across a large portion of Area C, is observed immediately below Stratum VII. This feature has been dated to 2410 ± 70 B.P., while the upper portion of Stratum VII, at its interface with Stratum VIII, yielded a date of 2100 ± 55 B.P. Stratum VII is a relatively thick layer, which appears to have been deposited rather rapidly. No bedding was observed within this layer, so it is probable that the dominant mode of deposition was by wind accompanied by cultural activity. Stratum VIII is a cultural stratum represented in three of the four pollen profiles in this study. Radiocarbon dates in this level range

from 2100 to 2050 B.P. at the interface with Stratum VII in the lower portion of the stratum to 1210 to 1010 B.P. in the middle of the level, and 580 to 520 B.P. in the upper portion of this stratum (Gooding, personal communication, September 1983). Wind and cultural activity again appear to have been the major modes of deposition for this stratum. Strata IX and X both appear to be modern.

The pollen record at Sisyphus Shelter is dominated by *Juniperus* pollen. *Pinus* pollen, normally an indicator of paleoenvironmental conditions, is represented in small quantities throughout the pollen record. As such, it is not a good index of the apparently minor variations in the local vegetation through time. The pinyon/juniper woodlands near the site are dominated by juniper. Within this ecotone a variety of soil types and geological origin of the soil support the vegetation. Growth and development of individual trees may be influenced by specific edaphic conditions, including soil type. Utah juniper (*Juniperus osteosperma*) and one-seeded juniper (*Juniperus monosperma*) presently grow in this area of Colorado. Herman (1958) notes that *Juniperus osteosperma* is often found on shallow, hard-panned upland soils rather than on the more mesic soils. Both Utah juniper and one-seeded juniper are also noted to grow on south-facing slopes. The root systems of juniper are generalized and rapidly adapt themselves to local edaphic conditons. Lateral roots, which may grow 15-40 cm below the surface compete directly with the roots of grasses for water. Taproots grow down toward bedrock or restrictive soil layers, then grow laterally and form less competition with herbaceous vegetation in the area. Juniper, then, are trees that adapt readily to local conditions that may not be conducive to the growth of other plants. These trees show an affinity for shallow, rocky soils.

Artemisia (sagebrush), on the other hand, requires winter saturation for good growth and relies less on summer moisture (Petersen, personal communication, 1982). *Artemisia* is frequently found growing on deeper soils. In the pollen record at Sisyphus Shelter, *Artemisia* frequencies vary in opposition to the *Juniperus* frequencies. The fluctuation of *Juniperus* and *Artemisia* pollen in opposition to one another is accentuated by using a *Juniperus*/*Artemisia* ratio, which is presented at the right side of the pollen diagram (Figure 45). Higher frequencies of *Artemisia* are used to

Figure 45.
Stratigraphic pollen diagram from Sisyphus Shelter.

indicate a greater availability of winter moisture, which comes in the form of snowpack in the Colorado mountains. Later snowmelt in the spring may be associated with increased moisture or snowpack in the winter and/or cooler temperatures. High frequencies of Juniperus pollen, on the other hand, are taken to indicate a warmer and perhaps drier paleoenvironmental episode. This follows the interpretations in pollen frequencies of the paleoenvironment at the DeBeque Rockshelter (Scott 1980a). Other arboreal pollen types present in the pollen record at Sisyphus Shelter include Betula, Picea, and Pseudotsuga, which are present due to wind transport from higher elevations in the mountains, Quercus, which is a component of the more local environment, and Salix, which is an element of the riparian community of the Colorado River. The major non-arboreal pollen types observed at Sisyphus include Artemisia, low- and high-spine Compositae, Cheno-ams, Sarcobatus, Ephedra, and Graminae (Table 9). The continuous presence of these pollen types, albeit in fluctuating frequencies, indicate that the elements of the vegetation communities have been stable throughout the past 4400 years in the vicinity of Sisyphus Shelter.

Non-patterned fluctuations in the pollen record in Stratum II, the mudstone/cultural level interface, make paleoenvironmental interpretation very difficult. Since there is no indication of the length of time represented by this stratum, the fluctuations may represent either short-term changes in the local vegetation, or slower, more gradual changes over a long period of time. Therefore, this period cannot be characterized either as one of fluctuating climatic conditions, or as one of relatively stable, slowly changing conditions that have been telescoped in the pollen record through slow sediment deposition. However, by the end of Stratum II and at the interface with Stratum III, a warm, potentially dry paleoenvironmental situation is in effect with very high Juniperus frequences and lower Artemisia frequencies. This condition remains sustained throughout Stratum III, then changes to a condition of more available winter moisture, and hence generally more mesic conditions in Stratum IV, which is a cultural level. These changes are noted in both pollen Columns B and C. Column D, containing a very thick deposition of Stratum IV, also records more mesic conditions during that period.

Table 9.
Pollen types observed at 5GF110, Sisyphus Shelter.

Scientific Name	Common Name
ARBOREAL POLLEN	
Betula	Birch
Juniperus	Juniper
Picea	Spruce
Pinus	Pine
Pseudotsuga	Douglas fir
Quercus	Oak
Salix	Willow
NON-ARBOREAL POLLEN	
Compositae	Sunflower family
Artemisia	Sagebrush
Low-spine Compositae	Includes ragweed, cocklebur, etc.
High-spine Compositae	Includes sunflower, aster, rabbitbrush, snakeweed, etc.
Cheno-ams	Pigweed and goosefoot family
Sarcobatus	Greasewood
Cleome	Beeweed
Ephedra	Mormon tea
Eriogonum	Buckwheat
Euphorbiaceae	Spurge family
Graminae	Grass family
Linum	Flax
Opuntia	Prickly pear cactus
Polygonaceae	Smartweed family
Ranunculaceae	Buttercup family
Rosaceae	Rose family
Sphaeralcea	Globe mallow
Umbelliferae	Carrot or parsley family

The interface of Strata IV and VII is marked by low Juniperus frequencies, and relatively high Artemisia frequencies. This condition changes rapidly in the lower portion of Stratum VII, particularly where Feature 9 is present. The pollen record within Feature 9 is characterized by high Juniperus frequencies, indicating a warmer and possibly drier paleoenvironmental situation. This condition persists throughout Stratum VII.

A decrease in Juniperus and increase in Artemisia pollen frequency is noted in the lower half of Stratum VIII in Column D, but is not noted until the upper portion of Stratum VIII in Column A. The lower portion of Stratum VIII in Column A exhibits an increase in Juniperus and decrease in Artemisia pollen, indicating a probable inconsistency in the deposition between these two portions of Stratum VIII.

Stratum IX, represented only in Columns B and D, and Stratum X, represented only in Column D, display relatively high frequencies of Juniperus pollen, and moderate frequencies of Artemisia pollen, indicating that the more recent climate is again warm and moderately mesic.

Comparison of the paleoenvironmental interpretation based on pollen from the Sisyphus Shelter with other pollen studies in western Colorado and the mountainous areas of Colorado provide some general similarities. Table 10 presents a summary of the conditions outlined in each of these comparative studies. The closest studies to the Sisyphus Shelter are from the DeBeque Rockshelter (Scott 1980a) and the Douglas Creek area (Scott 1983). Radiocarbon dates at the DeBeque Rockshelter place the deposits between 6950 B.P. (5000 B.C.) and 2560 B.P. (610 B.C.). At the DeBeque Rockshelter pollen from the lower sediments are indicative of a warmer and possibly drier condition between 7000 B.P. and 5650/5230 B.P., which correlates with the Altithermal period. Following that, conditions appear to become cooler between 5650/5230 B.P. and 3690 B.P. Then the climate appears to have warmed again between 3690 B.P. and 2560 B.P.

Although only a single radiocarbon date was obtained from the sediments at Douglas Creek, extrapolation from profiles in other dated sites in the Douglas Creek district indicates that sediments dating prior to approximately 2500 or 2800 B.P. appear to have been mesic. Conversely, sediments dating between 2500 B.P. and 1300 or 1400 B.P. were more xeric (drier) and possibly warmer. The interval between 1400 or 1300 B.P. and

Table 10.
Summary of paleoenvironmental interpretations.

Years BP	Sisyphus	DeBeque Scott 1980a	Douglas Creek Scott 1983	Petersen 1981	Petersen & Mehringer 1976	Andrews *et al.* 1975	Maher 1961, 1973	Markgraf & Scott 1981
0 1000 2000 3000 4000 5000 6000 7000	warm mesic warm warming mesic warm	warm cooler warm	dry mesic dry mesic	mesic dry mesic dry mesic dry mesic dry mesic	cool warm cool warm cool	warming cooler warm	warmer cooler warmer	warm and dry warm and moist

including a radiocarbon date of 780 B.P. was noted to be more mesic, and was followed by a short, drier episode in the recent past at the top of the diagram. The lowest mesic interval noted prior to 2500 B.P. correlates with a mesic interval at Sisyphus Shelter from 3620 to 3240 B.P. and possibly later. The warmer and possibly drier interval at Sisyphus Shelter, lasting before 2410 and possibly as early as 3000 B.P. to approximately 2000 B.P., correlates with a xeric or drier interval at Douglas Creek from 2500 to 1400 or 1300 B.P. Both areas then display more mesic conditions followed by brief, modern warming and/or drying conditions.

Palynological studies from the mountains in the southern portion of Colorado have yielded mutually conflicting evidence concerning the paleoenvironment. Petersen and Mehringer (1976) indicate that the period prior to 6700 B.P. was colder than present in the San Juan Mountains. The colder period was followed by a warmer period that lasted until approximamtely 4000 B.P. Another cold period followed, which lasted until 2500 B.P., when a short warming trend was noted. The warming trend lasted only about 100 years before returning to a cooler climate.

Andrews et al. (1975) depict a different climatic sequence for the San Juan Mountains. Conditions were warmer than present, from approximately 8000 B.P. until 3500 B.P., when the climate became cooler. This cooler trend continued until a few hundred years ago. A study from the La Plata Mountains contains still a different climatic interpretation. Maher (1961, 1973) notes that prior to 7000 B.P. the climate was cooler than present, with a warmer climate from 7000 B.P. to almost 5000 B.P. This warmer episode was followed by another cooler period, which lasted until approximately 3000 B.P. The final episode, which lasted until the present, was noted to be warmer. All three of these studies from the southern Rocky Mountains in Colorado indicate that the climate was warmer from at least 6500 B.P. to 5000 B.P., a period which is not represented in the Sisyphus Shelter deposits.

Pollen analyses at other locations in western Colorado with similar date ranges indicate a period of stability in the flora, albeit with some minor fluctuations in the frequencies of some of the pollen types, during the past 5000 to 6000 years. Pollen analysis at archaeological sites in the Curecanti Basin during 1978 and 1979 has recorded a relatively stable

environment dominated by _Artemisia_ for the past 6000 years (Scott 1980b). Palynological studies at archaeological sites in the Alkali Creek Basin near Crested Butte, Colorado, also record an environment dominated by _Artemisia_ for the past 5000 years (Scott 1980c). Markgraf and Scott (1981) note that the environment near Crested Butte changed from warm and moist to warm and dry at approximatley 4000 B.P. The sagebrush steppe in that vicinity has changed little during that time period. These two sagebrush ecotones (in the Curecanti Basin and near Crested Butte) appear to have been relatively stable during the past 4000 to 6000 years, indicating the absence of major changes in temperature and/or moisture levels. This stability is also reflected at the DeBeque Rockshelter, which retains the components of a pinyon/juniper ecotone throughout the stratigraphic sequence. None of these areas are particularly sensitive to environmental change due to their position within relatively large and stable econiches. Minor environmental changes should have little effect on the biotic makeup of these ecotones, unlike the effect exerted on environmentally sensitive areas, such as the alpine treeline.

Comparison of the paleoenvironmental interpretations from Sisyphus Shelter, DeBeque Rockshelter, and the Douglas Creek area (Scott 1983) yields evidence of an apparent district-wide response to changing paleoclimatic conditions. The pollen record from the DeBeque Rockshelter, however, appears to express a different local response to environmental conditions. There is less agreement between the Sisyphus Shelter pollen record and palynological studies farther removed from this study area. Pollen records from the San Juan and La Plata Mountains in the southern part of the state do not agree with one another in their interpretation of paleoenvironmental changes, although there is at least some agreement with material from Sisyphus Shelter. This indicates that there is some consistency in environmental response to what may be regional climatic fluctuations. Breakdown in comparability, then, occurs when climatic fluctuations vary within a region on a district level.

Subsistence

The use of various plants may leave pollen and microscopic plant remains or fibers on the tools used to prepare them. Sixteen manos and one metate

were sampled for their pollen and fiber content from the Sisyphus Shelter (Table 11). The quantity of juniper pollen in the washes appears to be slightly higher than that in the feature fills, but falls within the range of variation for the stratigraphic samples. Two manos and one metate did, however, contain microscopic juniper fibers (Figure 46). The largest frequency of pine pollen at this site was obtained from a metate, but it was only slightly larger than that observed in the stratigraphic levels. Clumps or aggregates of both high-spine compositae and Cheno-am pollen were noted in mano wash samples where the overall frequency of these pollen taxa was rather low, indicating the possibility that these manos were used to prepare members of these plant families. Grass fibers were also noted where grass pollen frequences were low, indicating the probability that these tools were used in the processing of grasses, perhaps grinding the seeds. The only evidence of the presence of Linum came from fibers at this site. Linum (flax) fibers were noted on one metate, and also in the layer of mixed recent domestic animal dung and clay from the uppermost level of the rockshelter. The presence of Linum fibers in the dung layer represents the probable inclusion of flax in areas grazed by animals that visited the shelter.

Specific ethnographic references concerning plants suspected to have been processed on these groundstone tools will be discussed relevant to the possible utilization of these tools, and the evidence such use might leave. Gallagher (1977:28-29, 122) and Goodwin (1935:52) note that juniper berries were an important food source for the Apache. The berries were eaten fresh, boiled, pounded to form a kind of bread, or soaked and pounded to make a liquid drink. Smith (1974) reports that the Northern Utes rubbed juniper berries with a mano to separate the seeds from the pulp. The pulp was then either eaten fresh or dried and ground on a metate. Both the Utes and Apaches used juniper "leaves" as a source of medicine, which was quite important in treating women during childbirth. In addition, juniper tea was frequently consumed during the last few months of pregnancy to prevent problems during childbirth. The presence of fibers from either the inner bark or twigs of juniper may be present on manos and metates if the outer tips of branches were ground to make a medicinal tea. Grinding the pulp of juniper berries is less likely to leave fibrous strands of juniper on the

Table 11.
Provenience of pollen samples from groundstone washes and features at Sisyphus Shelter.

Pollen Sample No.	Area	Stratum	Depth in cm below pgs	Pollen Counted	Provenience
1a	A	X	34	200	Center of basin, charcoal fill, F. 32, 4N/8E
2a	A	XI	15	300	Dung and clay, 5N/8E
3a	A	X	22	300	Soil, charcoal lens, 6N/8E
4a	A	VIII	41	200	Clay, 6N/8E
5a	A	VIII	30	200	Mano frag. wash, 7N/7E
6a	A	XI	10	200	Mano frag. wash, 4N/7E
7a	A	XI	24	100	Mano frag. wash, 8N, end of shelter
1c	C	X		200	Top soil fill, 4E
2c	C	VIII		20	Fill from firepit, F. 7, 3E
3c	C	VII	40-45	100	Mano frag. wash
4c	C	X	10	200	Mano wash
5c	C	X	0-10	200	Mano frag. wash, 3E
6c	C	VII	75	Insuff	Mano wash, just above F. 9
7c	C	VII	40-50	200	Mano frag. wash, F. 9
8c	C	VII	60-70	200	Fill, F. 9, clay
720	C	III		100	Handstone wash
731	C	III	89bd	100	Soil under handstone
823	C	IV	121.5bd	200	Mano wash, B2
831	C	VII	28	100	Handstone frag. wash, F. 9
1230a	C	IV	142bd	100	Metate wash, F. 29 intrusive into level III, relates to Stratum IV
1230b	C	IV	142bd	Insuff	Metate fill, F. 29
1231	C	IV	96bd	Insuff	Mano wash, F. 21
1232-5	B	VII		200	Mano wash, F. 30
1236	C	IV	121bd	200	Mano wash, CO
1244	C	IV	135-145	100	Mano wash, C-1

Figure 46.
Pollen diagram from feature fills and groundstone washes at Sisyphus Shelter.

metate than crushing juniper "leaves," but may introduce a few such fibers to the tool.

The ethnographic literature notes that pine nuts were ground on metates, either lightly with the shells on to release the parched nuts, or after the nuts had been shelled (Gallagher 1977:38). This process is not expected to result in the deposition of large quantities of Pinus pollen or wood fiber on the metates. Harrington (1967:325) notes that in addition to eating pinyon nuts, both Indians and Anglos exploited the inner bark of pine trees as a starvation food. During the spring, the outer bark was peeled off, exposing the more tender inner bark, which was then scraped or peeled off. It can be eaten raw, cooked, or dried for later use. After drying, the bark could be cooked or ground into a meal. Pine pollinates in the spring and if the bark was being exploited during pollination, it might introduce both pine pollen and fibers onto the metate when ground.

Salix (willow) bark is reported to have been used as a medicine by numerous Indians across the country (Densmore 1974; Weiner 1972). A decoction was commonly employed, usually without grinding the bark. Either fresh or dried bark would have had to be ground to leave fibrous evidence of its preparation on groundstone tools.

Artemisia is noted to have been used by many Indian groups as a medicine (Densmore 1974; Elmore 1944; Gilmore 1977; Smith 1974; Weiner 1972). Hellson and Gadd (1974) note that Artemisia was used medicinally to abort difficult pregnancies, among other things. Weiner (1972:37) notes that the leaves of Artemisia are crushed to emit the fragrance for use as a cold remedy. Such crushing of the leaves would introduce both pollen and microscopic plant fibers onto the groundstone tools if the plant was collected while it was pollinating.

Cheno-ams have been used both as potherbs and ground for meal by numerous Indian groups (Elmore 1977; Gallagher 1977; Gilmore 1977; Weiner 1972). Grinding Cheno-am seeds with a mano and metate will probably leave at least some pollen and microscopic plant fibers on the grinding surfaces.

Cleome has been exploited as a food, both as a potherb and as seeds to be ground into meal (Harrington 1967:72). Grinding the seeds into flour would result in the deposition of both pollen and plant fibers on the manos and metates used.

Grass (Graminae) seeds are noted to have been ground (Elmore 1944; Harrington 1967), which would probably introduce microscopic plant fibers onto the grinding surface. Large quantities of grass pollen are less likely to be deposited on the groundstone during grinding, since the seeds are ready for harvest after pollination has ceased.

Linum is noted to have been used both as a food (Gilmore 1977) and a medicine (Weiner 1972). Flax seeds are highly nutritive and used to impart a particular flavor to cooking. The leaves may be crushed for external application to boils and eyes. It is particularly this crushing of flax leaves that would be expected to leave fibrous evidence on groundstone surfaces.

Plants which have left either pollen or fiber evidence of their utilization on groundstone tools include Juniperus, Pinus, Salix, high-spine Compositae, Cheno-ams, Graminae, and Linum. All of these plants are noted to have been used for both food and medicines by native peoples, with the exception of Salix, which was used only as a medicine. Utilization of the groundstone implements appears to have been indiscriminant with respect to the preparation of food and medicinal plants. Stewart (personal communication, March 1982) notes that among the Utes the preparation of medicinal substances and herbs is done on an individual or household basis, while spiritual healing is left to the shaman. Stewart observed that the Utes use the available household groundstone for the preparation of both food and medicinal plants. The apparent indiscriminant use of these artifacts fits with the concept of the Archaic lifestyle--one in which seasonal rounds were made in a hunting/gathering economy--and subsistence relied on a wide variety of wild plants for the vegetal portion of the diet, as well as for medicinal and other purposes.

Comparison of data from the groundstone at Sisyphus Shelter with those obtained from sites on Battlement Mesa (Scott 1982) shows that a greater variety of plants were exploited at the Battlement Mesa sites. Pollen and fiber evidence at those sites indicate the utilization of Juniperus, Artemisia, Chéno-ams, Graminae, Portulaca, Linum, Solanaceae, Umbelliferae, Malvaceae, Sphaeralcea, Rumex, Prunus, Celtis, Shepherdia, Caryophyllaceae, Arenaria, Polemonium, and Verbatrum. This greater variety of plants that appear to have been utilized probably reflects a richer habitat and/or a

greater variety of habitats readily accessible from the Battlement Mesa sites. Like the material from Sisyphus, the groundstone at Battlement Mesa was used indiscriminantly for the preparation of both medicinal plants and food stuffs.

SUMMARY AND CONCLUSIONS

One can find agreement in other palynological studies for all portions of the paleoenvironmental interpretation at Sisyphus. The warmer episode indicated at Sisyphus, quite possibly from prior to 4400 B.P., and definitely by that date, until 3620 B.P. overlaps a warmer period noted by Petersen and Mehringer (1976) and Andrews et al. (1975) in southwestern Colorado. A more mesic interval noted between 3620 and 3240 B.P. (and perhaps later) at Sisyphus finds correlation with Petersen's 1981 study in the La Plata Mountains, where he notes a mesic interval encompassing two short-lived dry phases. This mesic interval may also be correlated with Petersen and Mehringer's (1976) colder episode at the same time period and overlaps with a portion of Andrews et al. (1975) cooler episode from approximatley 3400 B.P. to present. It also overlaps with Maher's cooler episode from 5000 to 3000 B.P., and the more mesic interval prior to 3000 B.P. at Douglas Creek (Scott 1983). This episode is followed by a warmer and possibly drier period at Sisyphus from approximately prior to 2410 B.P. and perhaps as early as 3000 B.P. to 2000 B.P. This coincides directly with a drier episode noted by Petersen (1981) in the La Plata Mountains, with a warmer, more long-lived episode noted by Maher in southern Colorado and with a drier episode noted by Scott (1983) in the Douglas Creek area. This is followed by a more mesic and possibly cooler period post-2000 B.P. to almost modern times. This is, again, consistent with Petersen (1981) with the exception that he finds a dry interval at approximately 1400 B.P., which may be reflected by the increase in Juniperus pollen and decrease in Artemisia pollen in the upper half of Stratum VIII. In addition, Andrews et al. (1975) note a continuation of a long cooler period during this time. Scott (1983) notes a mesic interval from approximately 1300 or 1400 B.P. to almost modern times. The last portion of the pollen diagram of Sisyphus in Strata IX and X, which are considered to be modern, exhibit warmer conditions.

This is in agreement with the upper portion of the Douglas Creek study (Scott 1983), as well as Maher's pollen studies (1961, 1963). Markgraf and Scott (1981) note a change from warm moist to warm dry conditons in the central mountains of Colorado near Crested Butte at 4000 B.P. There is no correlation between the paleoenvironmental records at the DeBeque Rockshelter and Sisyphus Shelter. The consistency throughout most of the pollen record indicates that this area has been part of the same environmental zone throughout at least the past 4400 years. Fluctuation in pollen frequencies indicates that changes in the climate affected the abundance and distribution of the local vegetation, but were not sufficient to cause major shifts in the vegetation.

The major occupational zones within this site noted in Strata IV, VII, and VIII occur during the more mesic interval in Level (Stratum) IV, a warmer interval in Level VII, and more mesic interval in Level VIII. It does not appear that occupation of this site was directly related to fluctuations in paleoenvironmental conditions.

Evidence for the utilization of groundstone at Sisyphus Shelter comes from pollen and microscopic fiber remains adhering to the tools. Plants which appear to have been processed at this site using groundstone tools include Juniperus, Pinus, Salix, high-spine Compositae, Cheno-ams, Graminae, Linum, and Opuntia. There is no consistency in the utilization of the artifacts, either through time, as evidenced by associaton with specific strata, or in separation of what may have been preparation of medicinal and food plants. The pollen and fiber evidence suggests that elements of the local environment were gathered for utilization at the site. There is no evidence to suggest that long distance gathering was undertaken, as all of these plants occur within a few miles of the shelter today.

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APPENDIX III

RELATIONSHIPS BETWEEN LITHIC TECHNOLOGY AND ENVIRONMENTAL CHANGES

By
Steve Dominguez

INTRODUCTION

The palynological and sedimentological analyses at Sisyphus Shelter disclose a local sequence of significant post-Hypsithermal environmental shifts in both precipitation and temperature. The cultural deposits of the shelter are discards of a technoeconomy which was dependent upon naturally occurring biota. These, in turn, varied temporarily in density, location, and reliability as the environment varied.

This appendix identifies probable relationships between the pollen-derived temperature sequence and various attributes of the flaked lithic assemblage at Sisyphus Shelter. Potential "causal" relationships between environment and technoeconomy are identified by examining the nature of the subsistence system and its supporting lithic technology. Testable expectations are derived and compared to various attributes of the flaked lithic assemblage. Contemporaneity of changes is not considered to <u>proof of</u> but rather <u>evidence for</u> causal relationships. Associations between changes in the environment and changes in the associated assemblages were tested using Kruskal-Wallis one-way test of variance.

DESCRIPTION OF RELATIONSHIPS

Consideration of the nature of hunter-gatherer adaptations for the Great Basin/Colorado Plateau regions and of the nature of lithic technologies will help to identify potentially causal relationships among the environment, economy and technology.

The diverse environments of the Great Basin and the Colorado Plateau are determined largely by orographic relationships within and outside these regions. Both the Great Basin and the Colorado Plateau lie in the rain shadow between the Rocky Mountains and the Sierra Nevadas. Each of these regions is comprised of arid valley or plains areas bordering or surrounding moister mountains or high plateaus. For every 300 meters of elevation, there is a two- to three-week differential in seasons, producing a wide variety of biotic communities within relatively short distances. Each community produces a unique set of exploitable biota relative to seasonal and supra-annual patterns in availability and reliability.

Steward (1938, 1970) described the functioning of a viable (and actual) hunter-gatherer adaptation for these regions. Bettinger and Baumhoff (1982), Swanson (1966), Thomas (1981) and others have expounded this description. Generally, this adaptation is dependent upon the ability of a group to respond to naturally occurring variations in the densities and availabilities of preferred resource biota. Resource variations occur on both seasonal and supra-annual scales. Responses to these variations were in the form of relocation (transhumance), subsistence task reorientation (alternative resource use) or demographic adjustments (band membership changes).

Human populations in this area were seasonally mobile, taking advantage of altitudinally induced seasonal differentials (and hence subsistence resource differentials) among biotic communities. The same general areas were utilized for long periods with annual variations in the ways in which they were used. The distances traveled, the specific localities utilized and the biota exploited would vary from year to year. High resource densities allowed greater use of an area, decreased travel and larger human aggregations. Low resource densities produced opposite effects, encouraging greater diversity in exploitive activities and more frequent contact with a greater number of areas.

Adjustments to supra-annual variations in resource densities made each year's round of activities unique. Accommodations to extensive climatic shifts could alter significantly the average band sizes, home ranges and exploitive tasks undertaken. Over long periods of time, such alterations affect the archaeological record.

Such systems were supported by several technologies (lithic, fiber, wood, etc.), various attributes of which are responsive to fluctuations in subsistence activities. Both Binford (1979) and Gould (1980) divide the tool kits of such supporting technologies into two fundamental parts, the situational or expedient tools and the personal or formal tools. Each of these major classes has a set of criteria and patterns for procurement, production, use, reuse and discard of items, as summarized in Table 12 shown on the following page.

Material procurement strategies may be direct (involving a trip to a source with specific intent of acquiring raw materials) or imbedded (acquisition of materials incidental to the performance of subsistence

Table 12.
Tool kit characteristics.

Situational/expedient	Personal/formal
Made to accomplish specific task	Made in anticipation of future needs.
Any suitable material used, frequently scavenged, or at least local, procurement casual	Specific materials preferred, deliberate procurement, possibly from distant source
Little labor invested in manufacture	More labor invested in manufacture
Designed according to options provided by materials	Designed to optimize functions
Items not transported for reuse, not maintained	Items transported, reused, maintained
Items discarded at or near site of use, not replaced until need arises	Items discarded and replaced when worn, and time and material availability allow

(After Binford [1979] and Gould [1980])

activities). Binford (1979) asserts that the necessity for direct procurement trips was avoided as much as possible by prior planning and Gould (1980) observed that among the Western Desert Aborigines, most procurement was imbedded. Variations in the number of areas foraged may be reflected by the number of different materials incorporated into the formal tool kit.

These patterns suggest that several archaeologically identifiable phenomena may have occurred in conjunction with environmental changes. These include variation in the intensity of subsistence related activities performed in and around the shelter, changes in the number of localities requisite for acquisition of adequate nutrients and changes in the types and scales of tasks performed.

TESTING THE EXPECTATIONS

The preceding text allows identification of direct archaeological implications of the aforementioned phenomena and produces a number of testable expectations. Tests are facilitated by the use of a linear time scale (Figure 47), where radiocarbon dates have been used to correct depositional rate differentials. The left column is the paleotemperature sequence constructed by Scott (this volume). Level VI, disturbed extensively by earth-moving

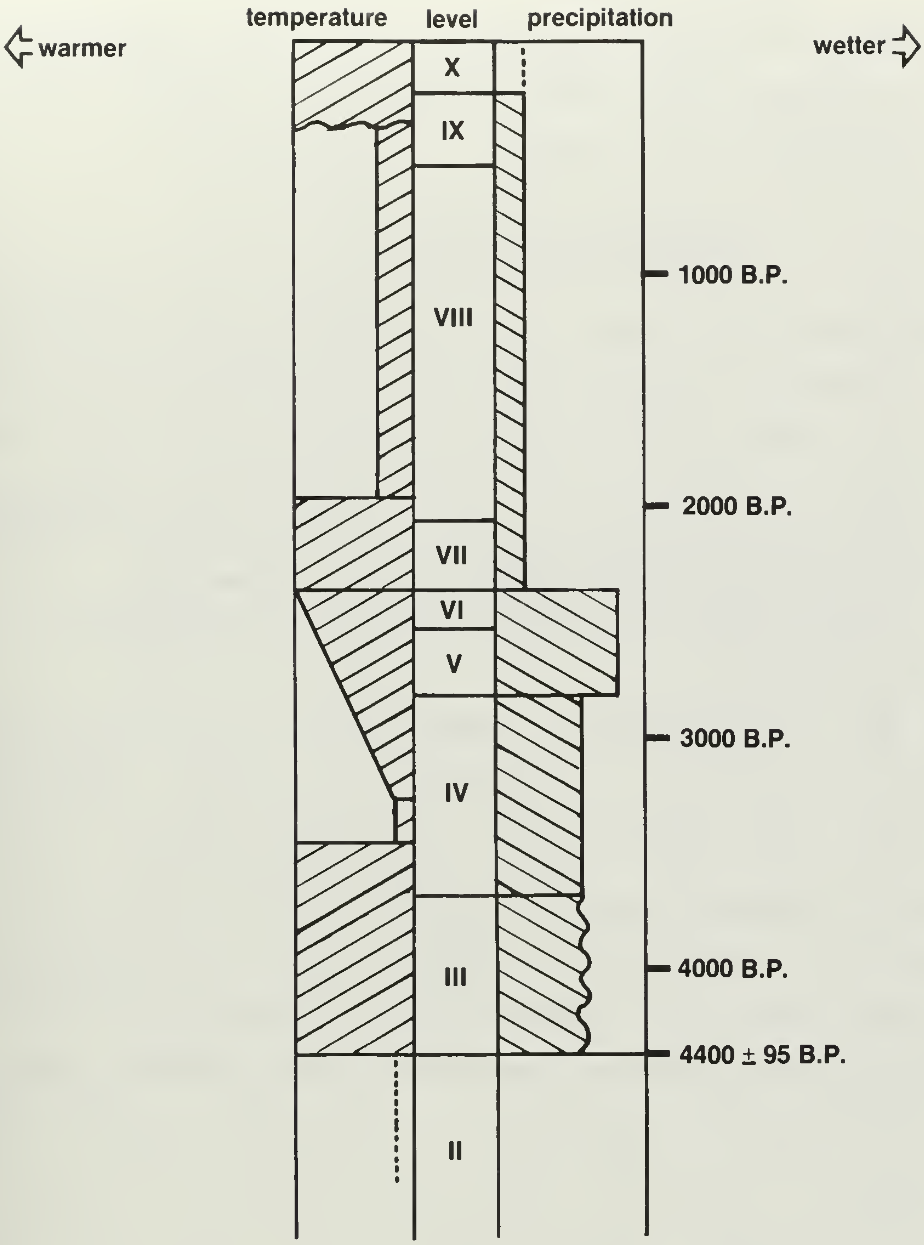


Figure 47.
Paleoenvironment and stratigraphy.

activities of the occupants of Level VII, Level II, for which there is no reconstruction available, and Level I, containing a meager sample of two flakes, have been excluded from testing.

SITE USE INTENSITY

One implication of the Steward model (1938, 1970) is that the frequency of use or the intensity of use of a site will decrease as the reliability or availability of either immediate or storable local resources decreases. Considering that the foraging technology varied relatively little over the period of occupation at Sisyphus, and that adjustments to variation in economic potentials involved behavioral or social adjustments, the intensity of use of a site should be roughly reflected by the number of items accumulated per unit time.

Figure 48 plots average number of items per unit time for each level. It can be seen that there is a correspondence between temperatures and accumulation rates. The Kruskal-Wallis test for the following relationships gives an H = 4.5, which gives a level of significance of 0.04 for D.F. = 1. The levels with the highest artifact accumulation rates, Levels III, VII, IX and X, correspond to warmer periods, suggesting that warmer conditions allowed or attracted greater use of the shelter. With the exception of Level V, which is very limited in areal extent, those levels with low rates, Levels IV and VIII, are associated with mesic periods. Other areas may have been more attractive for occupation during mesic conditions, possibly because of increased production elsewhere, decreased production at Sisyphus or a combination of both factors. The following test will clarify this distinction somewhat.

DIVERSITY OF FORAGING AREAS

A second characteristic of the Steward model (1938, 1970) is that decreased local resource densities require greater foraging areas and increased travel. Increased travel promotes more frequent contact with different stone sources, the products of which would be incorporated into the foragers' formal tool kits, utilized, then discarded later, some within the shelter. Increased frequency and regularity of acquisition, incorporation and

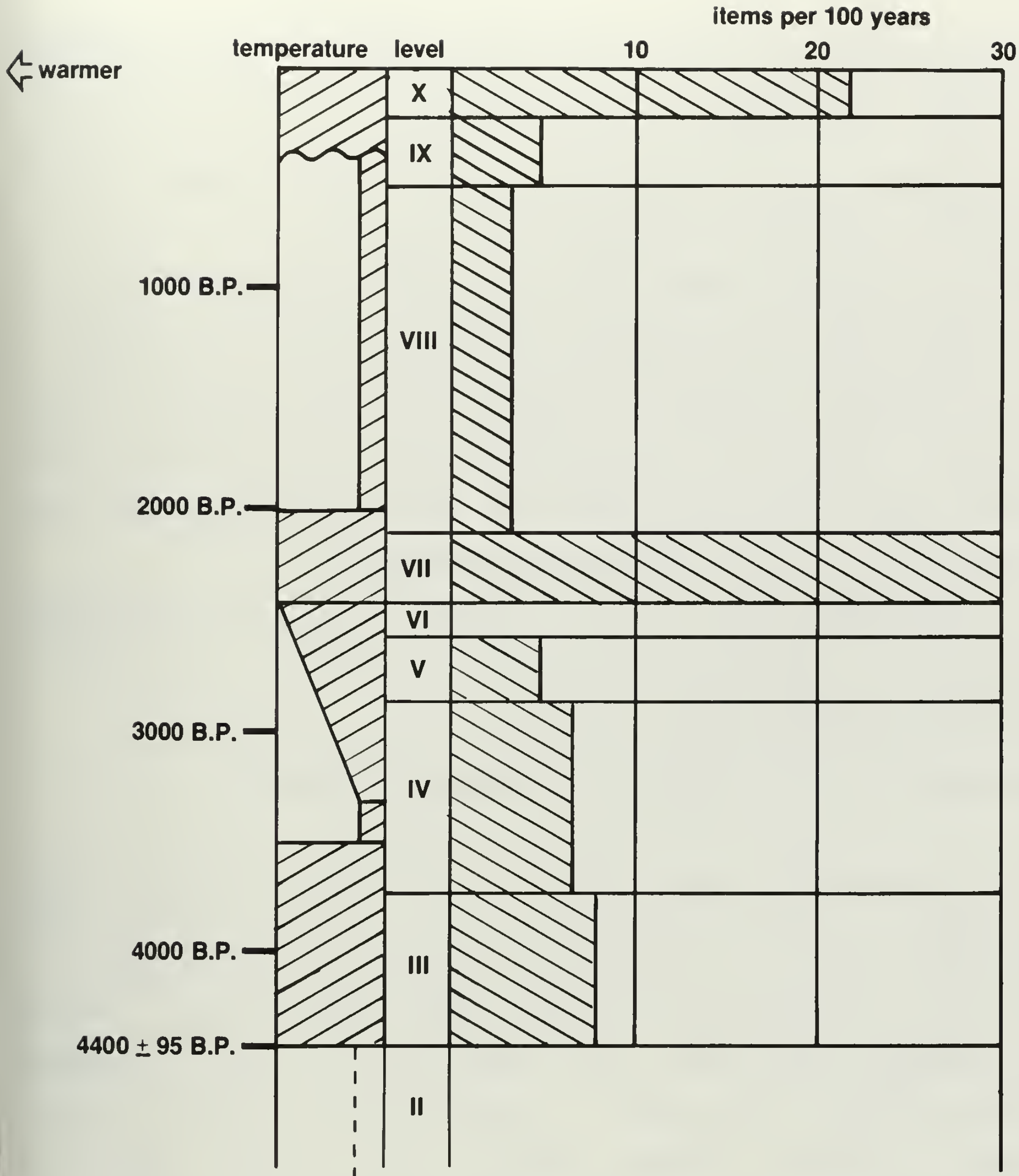


Figure 48.
Number of items discarded per unit time.

discard of different materials can be measured by the Shannon-Wiener diversity index. This measures the evenness of distributions of relative frequencies across a finite number of categories and is calculated by $H = \sum_{i} pk \ln pi$, where p is the proportion of relative frequency ($0 < p < 1.0$) represented by one category from a finite number of categories in a group.

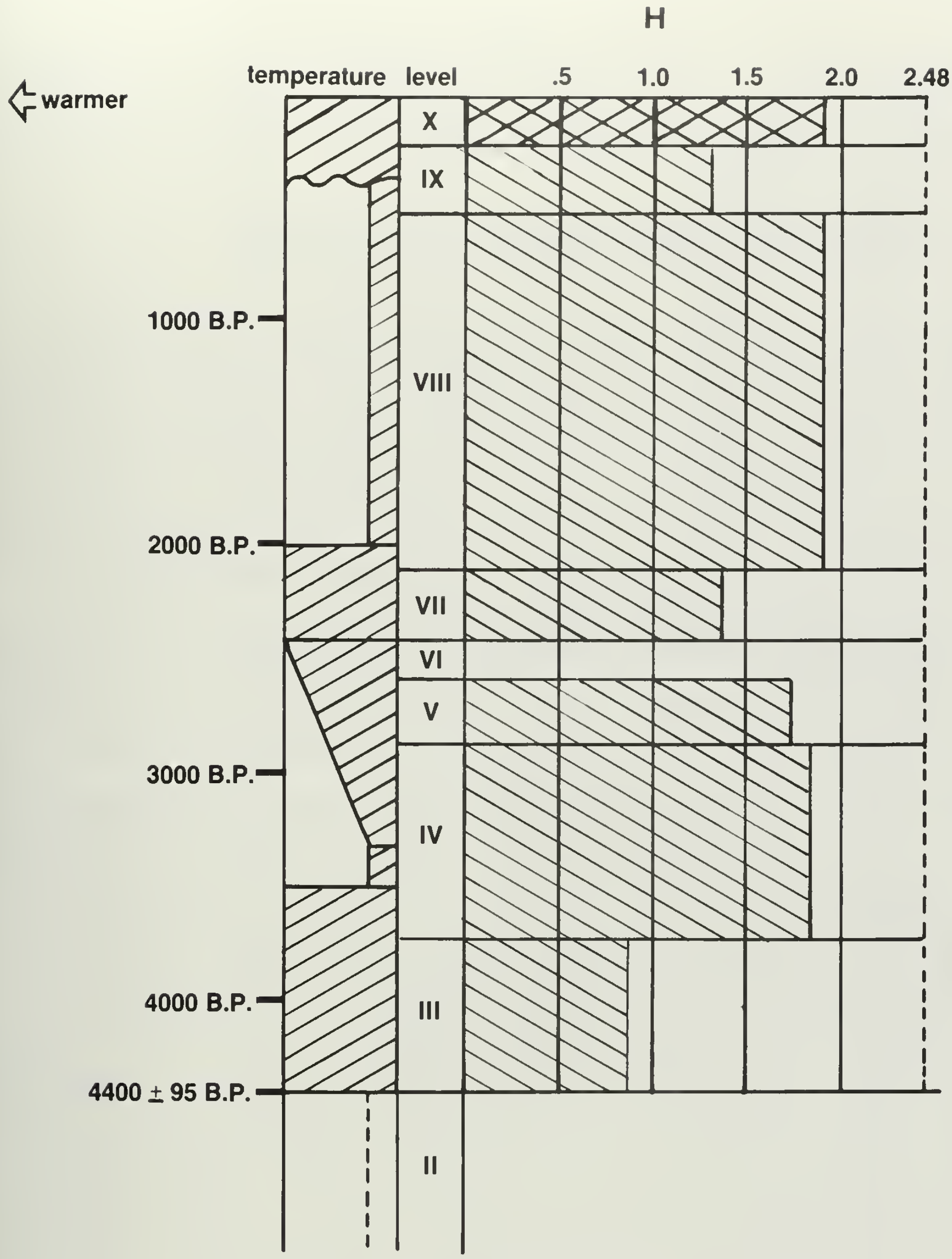
The diversity index for formal tool grade stone (12 categories of chalcedonies, cherts and quartzites) was calculated for each level included in testing and was compared to the highest possible index for i = 12, which is 2.48. These are plotted on Figure 49. Indices for mesic periods are near 0.75 of this maximum value, while those for warm periods are near to or less than 0.5 of this value. The Kruskal-Wallis test for these relationships gives an H = 3.42, which gives a level of significance of 0.07 for D.F. = 1.

Discard of more diverse material types occurs in mesic periods, suggesting that foraging activities promoted contact with a large number of stone sources with high regularity, thus covering a greater area.

SELECTIVITY IN EXPEDIENT TOOL MATERIALS

Expedient tool procurement, production, use and discard practices are very different from those of formal tools (see Table 12). Because expedient tools are constructed from the most suitable local materials, the diversity of material types is not expected to vary with environmentally induced technoeconomic changes, but rather with other factors, such as personal preference and technological refinements. Locally obtained materials used for expedient tools at Sisyphus include gneiss, schist, granite, phyllite, rhyolite, basalt, hornfels, sandstone, conglomerate, metasediment and quartzite. In analysis, the technologically and lithologically similar green quartzites and metasediments were not distinguished and four general categories of material types, metasediment/quartzite, sandstone, basalt and other metampophics, were established.

Diversity indices are plotted on Figure 50, where 1.4 is the maximum possible diversity for all levels. A consistent decrease in material diversity is shown from Level III through Level X, during which time the use of metasediment/quartzite for expedient tools increased from 42 to 90 percent. No Kruskal-Wallis test was performed for this relationship, which



Note: Cross-hatching in Level X indicates mixture with modern debris.

Figure 49.
Per-level diversity of materials used in formal tools.

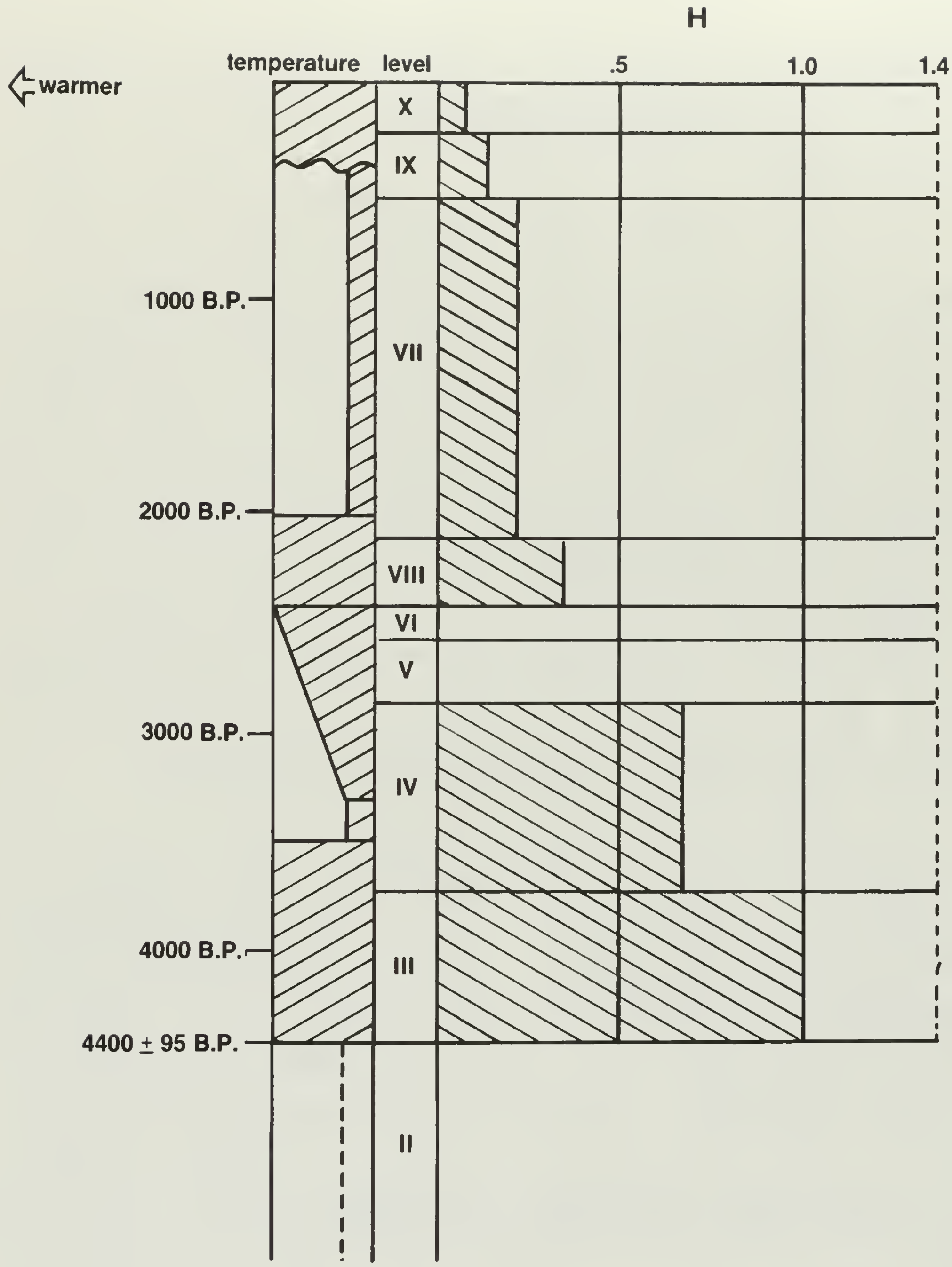


Figure 50.
Per-level diversity of materials used in expedient tools.

appears to be a time-related regression. This suggests an increased selectivity for this stone type, independent of paleoenvironmental factors.

SCALES OF TASKS AND TOOLS USED

Hayden (1979) and Gould (1978, 1980) have noted among the Western Desert Aborigines a general correspondence between types of tasks undertaken and the sizes and weights of tools used. These patterns cover both tools and debitage from these activities, so that the general scales of activities and fluctuations in scales should be reflected in the average volumes of the items in the assemblages from any level on a site.

In this test, volumes were roughly approximated by cubing the maximum dimension of each tool (valid only if relative dimensions of tools can be assumed to be constant through time). Averages of per-tool volume estimates for each level are plotted on Figure 51. The values plotted here show a weak correspondence between average tool size and paleoenvironment. The Kruskal-Wallis test for this correspondence gives a low $H = 1.13$, with a level of significance of only 0.26 with a D.F. = 1. This suggests that the scales of tools (and thus tasks) are not necessarily directly related to environment.

Table 13 shows per-level proportions of artifacts of different functional types as well as aggregated (or averaged) proportions for warm and mesic associated levels for these functional types. There is considerable variability among the proportions of the different levels, possibly an effect of sample size. However, aggregated proportions for all warm levels are very similar to those for mesic levels. Because of this similarity, no statistical tests were performed on this distribution. The similarity of these aggregated proportions suggests that the types of tasks performed in this area did not vary appreciably with environment. This is consistent with Steward's observation that although specific biota exploited may have varied, these generalized subsistence technologies did not vary appreciably.

CONCLUSIONS

The sequence in Sisyphus Shelter constitutes a record of response to environmental changes for a period of over 4400 years. Intensity of use appears to have been limited during mesic periods. This tendency is

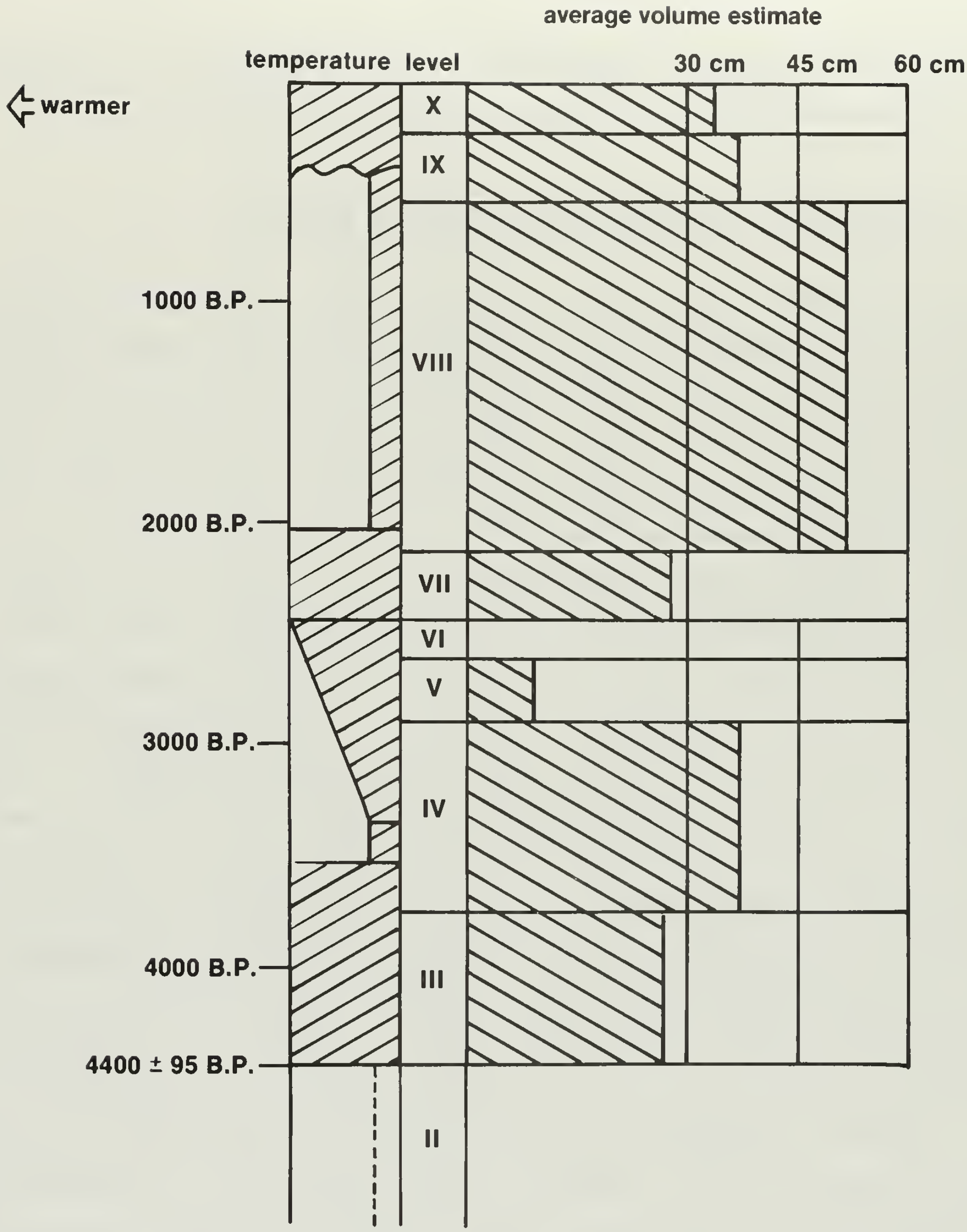


Figure 51.
Averages of per-tool volume estimates for each level.

Table 13.
Relative frequencies of tool types by level, Area C, and associations with paleoenvironment.

Level	Cutting	Scraping	Striking	Utilized Flakes	Debitage	Ground-stone
10	.18	.01	.02	.16	.58	.04
9	.25	.21	.00	.11	.39	.04
7	.12	.07	.03	.22	.46	.10
3	.06	.01	.01	.21	.63	.07
	.13	.05	.03	.20	.51	.08
8	.18	.06	.02	.15	.58	.01
5	.00	.07	.00	.07	.80	.00
4	.06	.00	.02	.18	.59	.12
	.10	.04	.02	.18	.60	.07

consistent with increases in formal tool material diversities, which is probably indicative of contact with larger numbers of source areas during foraging activities. Neither the sizes nor the types of stone items applied to tasks in or near the shelter varied significantly.

Thus, mesic conditions constituted a stress, to which the occupants of this area responded by decreasing intensity of activities in this area and by dispersing microbands into more areas. The specific resources involved in these changes are not discernible and alternative resources may not have involved the use of different tools.

This sequence is also marked by a peak in diversity of material types used for expedient tools that occurred around 4400 $\pm$ 95 B.P., and then a subsequent decrease. Metasediment/quartzites were being used in greater proportions, possibly a result of changing preferences.

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APPENDIX IV

FAUNAL INVENTORY AT SISYPHUS SHELTER (5GF110)

By
Marcia Kelly

FAUNA IDENTIFIED AT SISYPHUS SHELTER

Faunal remains identified from Sisyphus shelter occur in occupation zones 6 and 7. None are recorded for the earlier occupations 1 through 5. Of the species identified, mule deer (Odocoileus hemionus), followed by cow or bison (Bos/Bison), desert cottontail (Sylvilagus audobonii) and white-tailed jackrabbit (Lepus townsendii), in respective order, are the best represented in occupation zone 7. Remains of domestic sheep (Ovis aries), great horned owl (Bubo virginianus), raccoon (Procyon lotor), lizard, chickaree (Tasmiasciurus), and wood rat (Neotoma lepida and Neotoma linera) also occur in this zone, but in lower frequencies. In occupation zone 6 a few fragments of mule deer, desert cottontail and marmot (Marmota) or prairie dog (Cynomys) are present. Discrepancies in the number of bones, within each species group, with those listed for the faunal analysis (this volume) result from a lack of provenience data for some specimens.

OCCUPATION ZONE 7

Odocoileus hemionus

- 6 vertebral fragments
- 3 rib fragments
- 2 scapula fragments
- 3 humerus fragments
- 2 radius fragments
- 3 tibia fragments
- 1 metapodial fragment
- 7 phalanges
- 1 sesamoid bone
- 2 antler fragments
- 1 tooth fragment
- 4 long bone shaft fragments
- 3 unidentified fragments
- 38 total

Sylvilagus audobonii

- 1 skull fragment
- 1 mandible fragment
- 2 pelvic fragments
- 1 radius fragment
- 3 femoral fragments
- 1 tibia fragment
- 1 calcaneus
- 4 long bone shaft fragments
- 1 unidentified fragment
- 15 total

Bos/bison

3 tooth fragments
1 vertebral fragment
4 rib fragments
1 pelvic fragment
4 tibia fragments
1 metapodial fragment
1 phalanx
1 long bone shaft fragment
16 total

Ovis aries

1 vertebral fragment
1 cubo-navicular
1 long bone shaft fragment
3 total

Lepus townsendii

1 skull fragment
2 mandible fragments
1 vertebral fragment
1 humerus fragment
3 radius fragments
2 tibia fragments
2 long bone shaft fragments
12 total

Bubo virginianus

2 unidentified fragments

Procyon lotor

1 radial fragment

Lizard

2 vertebrae
1 hindlimb

Tamiasciurus hudsonicus 1 mandible
Neotoma lepida 1 unidentified fragment
Neotoma linera 2 unidentified fragments

OCCUPATION ZONE 6

Odocoileus hemionus

1 vertebral fragment
1 tibia fragment
2 unidentified fragments
4 total

Marmota or *Cynomys*

1 metarsal fragment

Sylvilagus audobonii

2 vertebral fragments
3 tibia fragments
1 metapodial fragment
6 total

APPENDIX V

MODERN FAUNAL INVENTORY OF WEST-CENTRAL COLORADO

By
Andrea Barnes

Table 14.
Inventory of mammals in west-central Colorado.
(after Bissel, ed. 1978).

Species	Status	Habitat Breeding	Habitat Non-breeding	Abundance Breeding	Abundance Non-breeding
Nuttall's cottontail	B	CF,DS,Sc, SF	--	C	--
Desert cottontail	B	DS,GL,Dx	--	Ab	--
White-tailed jackrabbit	B	Sc,PJ,Pp, T,Sg,Mm, Sa	--	Ab	--
Black-tailed jackrabbit	B	GL,Sc,DS, PJ	--	C	--
Least chipmunk	B	D,S,CF,A	--	C	--
Colorado chipmunk	B	Sc,CF,Pp	--	C	--
Uinta chipmunk	B	SF,Lp,DF	--	C	--
Yellow-bellied marmot	B	Sc,CF,A	--	C	--
White-tailed antelope squirrel	B	Sc,DS,PJ	--	R	--
Richardson's ground squirrel	B	DS,Ag,Mm	--	C	--
Thirteen-lined ground squirrel	B	GL,DS,PJ,U	--	C	--
Rock squirrel	B	Sc,PJ,Pp, Cr,R	--	C	--
Golden-mantled ground squirrel	B	S,PJ,Lp, SF,AT	--	Ab	--
White-tailed prairie dog	B	GL,S,DS,Sa	--	C	--
Chickaree	B	CF	--	C	--
Valley pocket gopher	B	GL,S,Ag	--	C	--
Northern pocket gopher	B	GL,Ag,MM,T	--	C	--
Apache pocket mouse	B	GL,DS,PJ	--	Und	--

Table 14, continued.

Species	Status	Habitat: Breeding	Habitat: Non-breeding	Abundance: Breeding	Abundance: Non-breeding
Ord's kangaroo rat	B	GL,DS,S,D	--	Ab	--
Beaver	B	D,Ms,L	--	C	--
Western harvest mouse	B	GL,R,Ag, Sa	--	Ab	--
Canyon mouse	B	Sc,PJ,BA (slickrock canyons)	--	C	--
Deer mouse	B	All types	--	Ab	--
Pinon mouse	B	Sc,PJ,Sa	--	C	--
Northern grasshopper mouse	B	GL,Sa,Cr, Sc	--	C	--
Desert wood rat	B	DS,PJ	--	R	--
Mexican wood rat	B	Sc,PJ,Pp	--	C	--
Bushy-tailed wood rat	B	S,CF,T,AT	--	C	--
Gapper's red-backed vole	B	DF,As,Lp, SF	--	C	--
Montane vole	B	CF,A,Ms, Cr,Sc	--	Ab	--
Long-tailed vole	B	Sa,CF,Ms, AT	--	C	--
Sage-brush vole	B	Sa	--	Und	--
Muskrat	B	Ms	--	C	--
Western jumping mouse	B	CF,R, (willow thickets)	--	C	--
Porcupinne	B	D,CF,A	--	C	--
Masked shrew	B	CF,A,Ms,Mm	--	C	--
Wandering shrew	B	CF,A,Ms,Mm R,Sc,HA	--	C	--

Table 14, continued.

Species	Status	Habitat Breeding	Habitat Non-breeding	Abundance Breeding	Abundance Non-breeding
Water shrew	B	SF,DF,C,Aq	--	C	--
Merriam's shrew	B	GL,Sa	--	Und	--
Coyote	B	All types	--	C	--
Red fox	B	R,Mm,A,Ms	--	C	--
Kit fox	B	DS,PJ	--	Und	--
Gray fox	B	GL,S,R,PJ, Pp,Sc	--	C	--
Ringtail	B	Sc,PJ	--	Und	--
Black bear	B	R,CF	--	C	--
Ermine	B	CF,A,Sc	--	Und	--
Long-tailed weasel	B	All types	--	C	--
Mink	B	R	--	Und	--
Badger	B	GL,S,PJ, T,Mm	--	C	--
Spotted skunk	B	R,S,PJ	--	C	--
Striped skunk	B	All types	--	C	--
Mountain lion	B	R,CF	--	R	--
Bobcat	B	S,CF,Ms,R	--	C	--
American elk	B	GL,CF	A	C	--
Mule deer	B	GL,R,CF	S	C	--
Pronghorn	B	GL	--	C	--
Bighorn	B	S	A	C	--

Key to Table 14, mammal inventory (after Bissel, ed. 1978)

STATUS: B - recent records or strong evidence of breeding

ABUNDANCE: Ab - abundant
C - common
R - rare
Und - undetermined

HABITAT:

GL - grassland
- Sg - shortgrass prairie (dominated by buffalo grass or blue grama)
- Bg - bunch grass (dominated by species such as little bluestem)
- Mm - mountain meadows, parks, semi-desert grasslands of the western slope

Ag - agricultural areas
- Cr - croplands
- Or - orchards
- Sb - shelter belts, dwellings and tree farms

Aq - aquatic
- L - lakes or reservoirs (not including edge vegetation)
- Ms - marshes
- St - streams and rivers (not including edge vegetation)

D - deciduous habitat
- R - riparian, flood plain, stream and lakeside vegetation
- As - aspen

S - shrub/brush
- Sc - scrub oak, mountain mahogany, etc.
- DS - desert shrub (saltbush, greasewood, etc.)
- Sa - sagebrush, rabbitbrush

CF - coniferous forest
- Pp - ponderosa pine
- Lp - lodgepole pine
- SF - spruce/fir
- PJ - pinyon/juniper
- DF - Douglas-fir
- C - other coniferous trees (Colorado blue spruce, bristlecone pine, white fir)

A - alpine
- T - tundra
- AT - alpine transition (willows or scrub conifers)

U - urban (cities, town, including city parks)

BA - barren areas with hardly any vegetative cover (rocks, alkali flats, sand dunes, gravel beds); identify

Table 15.
Inventory of birds in west-central Colorado.
(after Kingery and Graul, eds. 1978).

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Common loon	M	--	L	--	--	U	--
Horned grebe	M	--	L	--	--	FC-C	--
Eared grebe	M	L,Ms	L,Ms	--	FC	C-AB	--
Western grebe	n	L	L	--	FC	FC-Ab	--
Pied-billed grebe	R	L,MS	L,Ms	L,Ms	FC	FC	U
Double-crested cormorant	M	L,R,St	L	--	FC	C-Ab(fall)	--
Great blue heron	R	L,St,R	L,Ms,R,St	R,St	FC	FC	FC
Snowy egret	B	L,St	L,Ms	--	U	FC	--
Black-crowned night heron	B	Aq	L,Ms	--	FC	FC	--
White-faced ibis	M	L,Ms	Aq,Ag	--	--	U-c	--
Whistling swan	M	--	L,Ms	--	--	U	--
Canada Goose	R	Aq	Aq,Ag	Aq	C-Ab	C-ab	Ab
White-fronted goose	M	--	L,Ms	L	--	R-U	R-U
Snow goose	M	--	L,Ms	L	--	U	U
Mallard	R	Aw,Ag	Aq,Cr	Aq,Cr	C	Ab	C-Ab
Gadwall	M	Aq	L,Ms	L,Ms	FC	Ab	C
Pintail	W	Aq	L,Ms	L,Ms	FC	Ab	C
American green-winged teal	R	Aq	L,Ms	L,Ms	FC	Ab	C
Blue-winged teal	M	Aq	L,Ms	--	FC	Ab	--
Cinnamon teal	B	Aq	L,Ms	--	FC	R-C	--
American wigeon	W	Aq	L,Ms	L	C	Ab	FC
Northern shoveler	M	Aq	L,Ms	L	U	Ab	C

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Wood duck	M	L,St,R	Aq,R	L	R	R	R
Redhead	M	L,Ms	L,Ms	L	FC-Ab	Ab	FC
Ring-necked duck	n	L	L,Ms	L	R	FC-C	U
Canvasback	M	L,Ms	L	L	R	C	U
Lesser Scaup	Q	L	L	L	R	Ab	U
Common goldeneye	W	--	Aq	L,St	--	C	C
Barrow's goldeneye	W	--	L,St	L,St	--	U	R
Bufflehead	M	--	L	L	--	C	U
Ruddy duck	M	L,Ms	Aq	--	FC	C-Ab	--
Hooded merganser	M	Ms	L	St	R	U	R-U
Common merganser	R	Aq,R	Aq	Aq	FC	C	C
Red-breasted merganser	R	Aq,R	Aq	Aq	FC	C	C
Turkey vulture	B	R,cliffs	All	--	FC	FC	--
Goshawk	R	CF	CF,R	R,CF,Sa	U	U	U
Sharp-shinned hawk	R	CF,R,Sa	D,Cr,Mm	Cr,R	U	U	U
Cooper's hawk	R	CF,D,Mm	D,CF	R,Sc	U	U	U
Red-tailed hawk	R	Ag,D,CF,Mm	Ag,R,CF,Mm	Ag,R	FC	FC	FC
Swainson's hawk	B	GL,Ag,R,DS AT	R,Cr,Mm,DS	--	FC	FC	--
Rough-legged hawk	W	--	--	Ag,GL, Mm,DS	--	--	C
Golden eagle	R	GL,Pp,PJ, DS,R	--	Pp,PJ,R, Mm,DS	FC	--	FC
Bald eagle	W	R	R,St	R,L,St	R	U	FC
Marsh hawk	R	Cr,Ms, GL,DS	Cr,Sg,Mm, L,Ms,DS	Cr,Sg, Mm,L,Ms, DS,R	FC	FC	FC

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Osprey	M	R,L,St	L,R,St	--	U	U	--
Prairie falcon	R	cliffs in	Sg,Cr,Mm,	Sg,Cr, Sg,T,DS,PJ	U	FC DS	FC Mm,DS
Peregrine falcon	B	cliffs, R,CF	GL,R, Mm,Ms	Ms,Mm, GL,R	R	U	R
Merlin	M	--	GL,R	Cr,R,GL, Ms,DS	--	U	U
American kestrel	R	Ag,R,S,Sg	Ag,R,S,GL	Ag,R,S,Mm	FC	FC-Ab	FC
Blue grouse	R	CF,AT	--	SF,DF,Pp, Lp	FC	--	FC
Sharp-tailed grouse	R	Sa,Sc,Mm	--	Sa,Sc,Mm	U	--	U
Sage grouse	R	Sa	--	Sa	FC	--	FC
Gambel's quail	R	Mm,Sa,DS, Sg,BA	--	Sa,DS, Sg,BA	FC	--	FC
Ring-necked pheasant (introduced)	R	Ag,R	--	Ag,R	FC	--	FC
Chukar (introduced)	R	Mm,BA,DS, Ag	--	Mm,BA,DS, Ag	U	--	U
Turkey	R	S,Pp,PJ	--	S,Pp,PJ	U-FC	--	U-FC
Whooping crane	M	--	Ms,Cr,Sa	--	--	R-U	--
Sandhill crane	M	Mm	Cr,Ag,Sa	--	R-U	U-Ab	--
Virginia rail	B	Ms	Ms	Ms	FC	C	R
American coot	B	Ms,L	Ms,L	Ms,L	Ab	Ab	FC
Semipalmated plover	M	--	L	--	--	U-FC	--
Snowy plover	M	BA(alkali flats)	L	--	R	R	--
Killdeer	R	FL,Cr,U, Aq	GL,Cr,U,	Aq,U	C	C	U-FC
Black-bellied plover	M	--	L,Cr	--	--	R-U	--

Table 15, continued.

Species	Status	Habitat			Abundance		
		Breeding	Migratory	Winter	Breeding	Migratory	Winter
Common snipe	R	GL,Mm,R	R,Aq	R,Aq	FC	FC	U
Whimbrel	M	--	L,Ms	--	--	R	--
Solitary sandpiper	M	--	Aq	--	--	FC	--
Willet	M	Ms	L,Ms	--	Und	FC	--
Greater yellowlegs	M	--	L,Ms	--	--	FC	--
Lesser yellowlegs	M	--	L,Ms	--	--	FC-C	--
Pectoral sandpiper	M	--	L	--	--	U	--
Baird's sandpiper	M	--	L,Ms	--	--	FC-Ab	--
Least sandpiper	M	--	L,Ms	--	--	C	--
Long-billed dowitcher	M	--	L,Ms	--	--	FC	--
Semipalmated sandpiper	M	--	L,Ms	--	--	FC	--
Western sandpiper	M	--	L,Ms	--	--	FC	--
Marbled godwit	M	--	L,Ms	--	--	FC	--
Black-necked stilt	M	BA(alkali flats),Ms	L,Ms	--	U	U	--
Northern phalarope	M	--	L,Ms	--	--	U-FC	--
Herring gull	W	--	--	L	--	--	FC
California gull	M	L	L	--	FC	U-FC	--
Ring-billed gull	M	--	L	L	--	FC-Ab	FC-Ab
Franklin's gull	M	--	Aq,Ag,GL	--	--	FC-spring	-- Ab-fal
Bonaparte's gull	M	--	L,Ms	--	--	U-FC	--
Forster's tern	M	Ms	L,Ms	--	FC	U-FC	--
Black tern	M	Ms	L,Ms	--	FC	U-FC	--
Band-tailed pigeon	B	Pp,Sc	Pp,Sc,Cr	--	FC	FC	--

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Rock dove (introduced)	R	U,Ag,BA (cliffs)	--	U,Ag	C	--	C
Mourning dove	R	R,Ag,GL,	R,Ag,GL, S,U	R,Ag,GL, S,U	Ab S,U	Ab	U
Yellow-bellied cuckoo	B	R	--	--	U	--	--
Barn owl	R	R,Sb,BA (cliffs)	--	R,Sb	R	--	R
Screech owl	R	R	--	R	FC	--	FC
Great horned owl	R	R,CF,Ag	--	R,CF,Ag	FC-C	--	FC-C
Pygmy owl	R	CF,As	--	CF,R	U	--	U
Burrowing owl	B	GL	GL	--	U-FC	U	--
Long-eared owl	R	R,Sa,Pj	R,Sa	R	U	U	Irr-U
Saw-whet owl	R	R,Pp	--	R,Pp	U	--	U
Common nighthawk	B	GL,R,U	GL,R,U,S	--	FC	Ab	--
Black swift	M	Cliffs	--	--	R	--	--
White-throated swift	B	Cliffs	--	--	C	U	--
Black-chinned hummingbird	B	Cliffs	PJ,D,U	--	FC	FC	--
Broad-tailed hummingbird	B	D,S,CF Mm,U	S,R,CF, Mm,T	--	FC-C	FC	--
Rufous hummingbird	M	--	CF,R,M,T	--	--	FC	--
Calliope hummingbird	M	--	R,Pp,T	--	--	R	--
Belted kingfisher	R	R	--	R	FC	--	FC
Common flicker	R	D,CF,U	--	D,R,Pp,U	C	--	C
Lewis' woodpecker	R	R,Sc	R	R	U-FC	R	U
Williamson's sapsucker	B	CF,As	CF,As	--	U-FC	U	--
Hairy woodpecker	R	CF,D	CF,D	CF,D	FC	FC	FC

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Downy woodpecker	R	D,CF,S	--	D,CF,S	FC	--	FC
Northern three-toed woodpecker	R	SF	--	SF,Pp,DF	U	--	U
Eastern kingbird	B	Ag,GL,R	--	--	U	--	--
Western kingbird	B	Ag,R	--	--	FC	--	--
Ash-throated flycatcher	B	PJ,R,GL	R	--	U	U	--
Say's phoebe	B	Ag,S,GL (Bridges)	--	--	FC	--	--
Hammond's flycatcher	B	CF	--	--	FC	--	--
Gray flycatcher	B	PJ	PJ	--	U	Und	--
Western flycatcher	B	D,Sa	R	--	FC	R	--
Olive-sided flycatcher	B	R,SF	R	--	FC	FC	--
Horned lark	R	GL,DS,T,U	--	GL,DS	A-Ab	--	Ab
Tree swallow	B	D,CF	R,Aq	--	C	C-Ab	--
Bank swallow	B	Sand banks	R,Aq	--	FC	U-FC	--
Rough-winged swallow	B	Banks - R,Ag	Ag,R	--	FC	FC-C	--
Barn swallow	B	Structures-Ag,Aq,R	Ag,Aq,R	--	C	AB	--
Cliff Swallow	B	Cliffs, Ag,Aq,R, Structures	--	--	Ab	--	--
Gray jay	R	SF,Lp	--	--	Ab	--	--
Steller's jay	R	CF	R,U	--	FC	R	--
Scrub jay	R	Sc,PJ	--	Sc,PJ	FC	--	FC
Black-billed magpie	R	FL,Ag,R, S,CF	--	Ag,R	C-Ab	--	C-Ab

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Common crow	R	Ag,R,U	Ag,R,U	Ag,R,U	FC	C-Ab	C-Ab
Pinyon jay	R	PJ	PJ,R,Sg,	PJ,R,Sg, Sc,T	FC Sc	FC	FC
Clark's nutcracker	R	CF	CF,T	CF	FC	--	--
Black-capped chickadee	R	D	--	D	FC-C	--	FC-C
Mountain chickadee	R	CF	--	CF	FC	--	FC
Plain titmouse	R	PJ	--	PJ	FC	00	FC
Bushtit	R	PJ,S,R	--	PJ,S,R	U	--	U
White-breasted nuthatch	R	CF,D	--	CF,D	FC	--	FC
Red-breasted nuthatch	R	CF,D	--	CF,D	U-FC	--	U-FC
Brown creeper	R	CF,R	--	CF,R	U-FC	--	U-FC
Dipper	R	St	--	St	FC	--	FC
House wren	B	D,CF	--	--	FC	--	--
Bewick's wren	R	PJ,R	R	PJ,R	U-FC	R	U
Long-billed marsh wren	R	Ms	Ms	Ms	U	U	U
Canyon wren	R	Cliffs	--	Cliffs	FC	--	FC
Rock wren	R	Sg,BA-rocks	Sg,BA-rocks	Sg,BA-rocks	FC	U	U
Mockingbird	R	Ag,R,S,PJ	--	Ag,R,S,PJ	U-C	--	U-C
Gray catbird	B	R	R	--	FC	FC	--
Sage thrasher	B	S	S	--	FC	FC	--
American robin	R	Ag,D,S,	Ag,D,S, CF,U	R,U,Pp, CF,U	Ab Ag,Mm	Ab	FC
Hermit thrush	B	CF	R,U	--	C	FC	--
Swainson's thrush	B	R	R,U	--	FC	FC-Ab	--

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Western bluebird	B	Pp,Mm	Ag,GL,D, Pp,Mm	Pp,Sc,PJ, D,U	U-FC	U	U-FC
Mountain bluebird	B	Mm,As, Pp,PJ	GL,Ag,U	PJ,Ag,Mm	FC-C	C-Ab	FC
Townsend's solitaire	R	CF,As	PJ	Pp,R,PJ, Sb	FC	FC	FC-C
Blue-gray gnatcatcher	B	PJ,Sc,Sa	R,S,PJ	--	FC	FC	--
Golden-crowned kinglet	R	CF	R,CF	R	FC	FC-C	U-FC
Water pipit	M	T	Aq,R,Ag	--	FC-C	C	--
Bohemian waxwing	W	--	--	Ag,D,CF,U	--	--	Irr
Cedar waxwing	W	R,Sb	R,Ag,PJ	U,R,Ag	U	FC	Irr
Northern shrike	W	--	--	Sg,Ag,Mm, R,S	--	--	FC
Loggerhead shrike	R	Sg,Mm,Ag, R,S	--	GL,S	C-FC	--	U
Starling (introduced)	R	Ag,U,R	--	Ag,U,R	Ab	--	Ab
Gray vireo	B	PJ	PJ	--	R-FC	R	--
Solitary vireo	B	Pp	R,Sb	--	FC	FC	--
Warbling vireo	B	D	R	--	FC	FC	--
Black-and-white warbler	M	--	R	--	--	U	--
Orange-crowned warbler	B	D,Sc,PJ	D,Sb,Sc, PJ,Pp	--	FC	C	--
Virginia's warbler	B	S	R,Sc,Mm	--	FC-C	FC	--
Yellow warbler	B	R,U	--	--	C	--	--
Yellow-rumped warbler	B	CF,D	CF,D,Mm,U	R	C	Ab	R

Table 15, continued.

Species	Status	Habitat			Abundance		
		Breeding	Migratory	Winter	Breeding	Migratory	Winter
Black-throated gray warbler	B	PJ	R,Sc,PJ	--	C	U	--
Townsend's warbler	M	--	D,Sa,CF	--	--	U-spring	-- FC-fall
MacGillivray's warbler	B	D,Sc	R,Sc,Sb	--	FC	FC	--
Common yellowthroat	B	R,Ms	R,Ms	--	C	C	--
Yellow-breasted chat	B	R,S	R,S,Sb	--	FC	U	--
Wilson's warbler	B	AT,D	R,S,U	--	FC-C	C	--
American redstart	M	R	R	--	U-FC	FC-C	--
House sparrow (introduced)	R	Ag,U	--	Ag,U	Ab	--	Ab
Bobolink	B	GL,Cr (hayfields, fallow fields)	GL,Cr	--	R	R	--
Western meadowlark	R	Sg,Mm,Cr	--	GL,Ag	C-Ab	--	FC
Yellow-headed blackbird	B	Ms	Ms,Ag,R	--	C	C-Ab	--
Red-winged blackbird	R	Ms,Ag,GL	R,Ag,Ms	Ag,Ms,U	Ab	Ab	C
Northern oriole	B	R,Sb	R,Sb	--	FC	FC	--
Brewer's blackbird	R	R,Ag,Mm	R,Ag	R,Ag	FC-C	C-Ab	R-FC
Common grackle	M	R,Ag,U	--	--	C	--	--
Brown-headed cowbird	B	D,Ag,CF, S,U	--	--	FC	--	--
Western tanager	B	D,Pp,Sc	R	--	FC	FC	--
Rose-breasted grosbeak	M	R	R,Ag,Sb	--	R	U	--
Black-headed grosbeak	B	D,Pp,Sc	R	--	FC	FC	--

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Blue grosbeak	B	R,S	R	--	U	FC	--
Lazuli bunting	B	Sc,Sa	S,R	--	Und	Und	--
Evening grosbeak	W	CF	--	R,U	FC	--	U-C
Cassin's finch	R	CF	CF	Pp	FC	FC	FC
House finch	R	U,Sa	U,R,Sa	U,R,Sa	U-C	C	U-C
Pine grosbeak	R	SF	--	CF	FC	--	U-FC
Gray-crowned rosy finch	W	--	--	GL,BA,U	--	--	FC-Ab
Black rosy finch	W	--	--	GL,BA,U	--	--	U-C
Brown-capped rosy finch	W	T	--	GL,BA,U	FC	--	C
Common redpoll	W	--	--	GL,S	--	--	Irr
Pine siskin	R	CF,R	CF,R,U	R,Ag,U	FC	Ab	C
American goldfinch	R	R	R	R,U	FC	FC	C
Lesser goldfinch	B	R,S	R	--	FC	FC	--
Red crossbill	R	CF	CF	CF	FC	Irr-FC	Irr-FC
Green-tailed towhee	B	R,S	R,S	--	FC	FC	--
Rufous-sided towhee	R	S,R	S,R	S	FC	FC	U
Grasshopper sparrow	B	GL	GL	--	U	R	--
Baird's sparrow	M	--	GL	--	--	R	--
Vesper sparrow	B	GL,S	GL,S	--	FC-C	FC-C	--
Lark sparrow	B	FL,S	GL,S,As	--	FC-Ab	FC-Ab	--
Black-throated sparrow	B	PJ,S	Sa	--	U-C	R-U	--
Sage sparrow	B	Sa	S	--	U-FC	R	--
Dark-eyed junco	W	--	--	R,Pp,Sa,U	--	--	C-Ab
Gray-headed junco	R	D,CF	R	R,U	FC-C	FC-C	FC-C

Table 15, continued.

Species	Status	Habitat Breeding	Habitat Migratory	Habitat Winter	Abundance Breeding	Abundance Migratory	Abundance Winter
Tree sparrow	W	--	R	R,GL,Sa,Ag	--	FC	FC-Ab
Chipping sparrow	B	R,Pp,PJ,S	R,GL,U	--	FC-C	FC-C	--
Brewer's sparrow	B	S	GL,R,S	--	C	FC	--
Harris' sparrow	W	--	--	R,U,S	--	--	U
White-crowned sparrow	R	AT,R	R,S	R	FC-C	C	C
White-throated sparrow	W	--	R	R	--	R	U
Lincoln's sparrow	B	R,AT,Mm	R	--	FC	FC	--
Song sparrow	R	R,Ms	R	R,Ms	FC	C	FC
Lapland longspur	M	--	--	GL,Ag	--	--	U-Ab
Chestnut-collared longspur	M	Sg,HA	Sg,Mm	--	FC	--	--
Snow bunting	W	--	--	Mm,Sa,GL	--	--	R

Key to Table 15, bird inventory. (after Kingery and Graul, eds. 1978).

STATUS:
- R - resident (breeds, and present year-round)
- B - breeding
- n - non-breeder, but present during the nesting season
- W - winter visitor
- M - migrant

ABUNDANCE:
- Ab - abundant
- C - common
- FC - fairly common
- U - unusual
- R - rare
- Und - undetermined
- Irr - irregular

HABITAT:

GL - grassland
- Sg - shortgrass prairie (dominated by buffalo grass or blue grama)
- Bg - bunch grass (dominated by species like little bluestem)
- Mm - mountain meadows, parks and semi-desert grasslands of the western slope
- HA - habitat alteration areas, like crested wheat grass

Ag - agricultural areas
- Cr - croplands
- Or - orchards
- Sb - shelter belts, dwellings and tree farms

Aq - aquatic
- L - lakes or reservoirs (not including edge vegetation)
- Ms - marshes
- St - streams and rivers (not including edge vegetation)

D - deciduous habitat
- R - riparian, flood plain, stream and lakeside vegetation
- As - aspen

S - shrub/brush
- Sc - scrub oak, mountain mahogany, etc.
- DS - desert shrub (saltbush, greasewood, etc.)
- Sa - sagebrush, rabbitbrush

CF - coniferous forest
- Pp - ponderosa pine
- Lp - lodgepole pine
- SF - spruce/fir
- PJ - pinyon/juniper
- DF - Douglas-fir
- C - other coniferous trees (Colorado blue spruce, bristlecone pine, white fir)

Key to Table 15, continued.

A - alpine
T - tundra
AT - alpine transition (willows or scrub conifers)

U - urban (cities and towns, including city parks)

BA - barren areas with hardly any vegetative cover (rocks, alkali flats, sand dunes, gravel beds); identify

Table 16.
Inventory of reptiles and amphibians in west-central Colorado. (after Hammerson and Langlois, eds. 1981).

Species	Status	Habitat Breeding	Habitat Non-breeding	Abundance Breeding	Abundance Non-breeding
Tiger salamander	B	Ms, In	SF,LP,PP,DF, As,PJ,SaRb, GrSa/Sb,Sa, Sc,Mm,SgP, SgSd,MXP,TgP, SgM,MmP,RpL RpT,RpH,Ag, U,OW-L/R	C	U
Boreal toad	B	Ms	SF,LP,PP,DF As,MmP,RpH	FC	FC
Red-spotted toad	B	In	PJ,GrSa/Sb, SgP,RpL,ts, cl	FC	U
Woodhouse's toad	B	Ms,In*	PP,PJ,SaRb,U GrSa/Sb,Sa, Sc,SgP,SgSD, MSP,TgP,SgM, RpL,Ag,RpT	C	C
Canyon treefrog	B	In	ts,cl,RpL	FC	FC
Boreal chorus frog	B	Ms,In	MmP,RpL,RpT, RpH,As,Ag	C	U
Bullfrog	B	Ms,In	RpL,RpT	C	C
Northern leopard frog	B	Ms,In	RpL,RpT,RpH, ts,cl	C	C
Great Basin spadefoot	B	In	PJ,GrSa/Sb, ts,cl	FC	U
Yellowhead collared lizard	B	PJ,SaRb, GrSa/Sb, SgSD,ts, cl	--	C	--
Pale leopard lizard	B	SaRB, GrSa/Sb	--	U	--

Table 16, continued.

Species	Status	Habitat Breeding	Habitat Non-breeding	Abundance Breeding	Abundance Non-breeding
Short-horned lizard	B	PP,DF,As, PJ,SaRb, GrSa/Sb,Sa Sc,MM,SgP, TgP,SgSD, cl	--	FC	--
Northern sagebrush lizard	B	PP,DF,PJ, cl,SaRb, GrSa/Sb,Sc Sa,SgSD	--	FC	--
Northern plateau lizard	B	PP,DF,PJ, SaRb,Sa, Sc,cl,ts, GrSa/Sb	--	C	--
Northern tree lizard	B	PP,PJ,Sc, SaRb,MM, GrSa/Sb, ts,cl	--	C	--
Northern side-blotched lizard	B	PJ,SaRb, GrSa/Sb, Sc,MM,cl, ts	--	C	--
Northern whiptail	B	PJ,SaRb, GrSa/Sb, RpL,cl,ts	--	C	--
Plateau striped whiptail	B	PJ,SaRb, GrSa/Sb, Sc,RpL, ts,cl	--	C	--
Western yellowbelly racer	B	SaRb,RpL, GrSa/Sb,Ag	--	U	--
Great Plains rat snake	B	SaRb,SgP, GrSa/Sb,Ag, RpL,U	--	U	--
Mesa Verde night snake	B	PJ,cl,ts, GrSa/Sb	--	U	--

Table 16, continued.

Species	Status	Habitat Breeding	Habitat Non-breeding	Abundance Breeding	Abundance Non-breeding
Milk snake	B	PJ,DF,PP, GrSa/Sb, Sc,SaRb, MM,SgP,TgP, RpL,RpT,Ag, sd	--	U	--
Desert striped whipsnake	B	PJ,SaRb, GrSa/Sb,Sc, ts,Sg,SD, MM,RpL	--	U	--
Great Plains gopher snake	B	PJ,SaRb, ts,Sc,MM, GrSa/Sb,cl, SgSD,RpL,Ag	--	FC	--
Utah blackhead snake	B	SaRb,ts, GrSa/Sb	--	U	--
Wandering garter snake	B	RpL,RpT, RpH,Ms,In	--	C	--
Midget faded rattlesnake	B	PJ,SaRb, GrSa/Sb, ts,cl	--	U	--
Western rattlesnake	B	PJ,SaRb, GrSa/Sb, RpL,RpT, ts,cl	--	U	--

Key to Table 16, reptile and amphibian inventory. (after Hammerson and Langlois, eds. 1981).

STATUS: B - occurrence documented by museum specimen, photograph or published record

ABUNDANCE:
- C - common
- FC - fairly common
- U - unusual

HABITAT:

- T - tundra
- AT - alpine transition
- Lm - limber pine
- SF - spruce fir
- LP - lodgepole pine
- Bc - bristlecone pine
- PP - ponderosa pine
- DF - Douglas-fir
- As - aspen
- PJ - pinyon/juniper
- SaRb - sagebrush, rabbitbrush
- GrSa/Sb - greasewood, sagebrush or greasewood, saltbush
- Sa - sagebrush
- Sc - scrub oak
- MM - mountain mahogany
- SgP - shortgrass - Plains
- SgSD - shortgrass - semi-desert
- MXP - mixed grasses of habitat alteration areas on Plains
- TgP - tallgrass - Plains
- SgM - shortgrass - mountains
- MmP - mountain meadow-parkland (wet and dry)
- RpL - riparian lowland
- RpT - riparian transition
- RpH - riparian highland
- Ms - marshes, bogs, wet hummocks or shallow portions of lakes, ponds, reservoirs or slow streams
- W/OG - wet open ground
- OW-St/Ri - open water - streams or rivers
- OW-L/R - open water - lakes, ponds or reservoirs
- In - intermittent ponds, reservoirs or streams
- Ag - agricultural areas (croplands, orchards, shelter belts, dwellings, tree farms)
- U - urban (cities, towns, including city parks)
- ts - talus slope or other rocky slope
- sd - sand dune
- cl - rocky cliff, dirt bank or exposed bedrock
- * - indicates that the breeding habitat generally is occupied only during the breeding season

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